REPORT RESUMES

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THE USE OF CLOSED CIRCUIT TELEVISION IN TECHNICAL EDUCATION, REPORT OF THE EUROPEAN SEMINAR (SERAING, BELGIUM, APRIL 1965).

COUNCIL OF EUROPE, STRASBOURG (AUSTRIA)

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AT A EUROPEAN SEMINAR PARTICIPANTS FROM BELGIUM, THE UNITED KINGDOM, FRANCE, SWEDEN, AUSTRIA, GERMANY, IRELAND, NETHERLANDS, NORWAY, SPAIN, AND THE HOLY SEE DISCUSSED CLOSED CIRCUIT TELEVISION AS A TEACHING AID IN TECHNICAL EDUCATION. IN ORDER TO ENCOURAGE THE RETHINKING OF TEACHING METHODS IN THE LIGHT OF THE POSSIBILITIES AFFORDED BY TELEVISION, BOTH EXPERTS AND INEXPERIENCED PERSONS WERE BROUGHT TOGETHER TO EXCHANGE IDEAS AND FINDINGS. EXPERIMENTERS POINTED OUT THE DISADVANTAGES OF A PASSIVE LEARNING SITUATION FOR THE STUDENTS AND A NATURAL RESISTANCE ON THE PART OF TEACHERS TO THE INTRODUCTION OF TELEVISED INSTRUCTION. ADVANTAGES CITED, HOWEVER, ARE NUMEROUS--ALL THE STUDENTS ARE ABLE TO SEE THE MONITORS WHICH IN TURN ENABLE THE DETAILS OF DEMONSTRATIONS AND GRAPHICS TO BE SEEN EASILY, OVERFLOW CLASSES CAN BE ACCOMMODATED BY ADDITIONAL MONITORS IN SEPARATE ROOMS, AND LESSONS, WHEN CAREFULLY PREPARED WITH AN EMPHASIS ON VISUAL MATERIAL, ARE AT LEAST AS EFFECTIVE IN THEIR TEACHING AS ORDINARY CLASSROOM PROCEDURES. TELEVISED INSTRUCTION CAN NEVER COMPLETELY SUBSTITUTE FOR THE PHYSICAL PRESENCE OF A TEACHER, BUT EVEN A VERY SIMPLE TELEVISION SYSTEM CAN BE AN EFFECTIVE STEP IN A LARGER LEARNING SCHEME WHERE PROVISION FOR STUDENT-TEACHER CONTACT IS ALSO MADE. (RS)

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THE USE OF CLOSED CIRCUIT TELEVISION IN TECHNICAL EDUCATION

COUNCIL OF EUROPE
1966

THE USE OF CLOSED CIRCUIT TELEVISION IN TECHNICAL EDUCATION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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Report
of the European Seminar
held at Seraing, Belgium, in April 1965

Council for Cultural Co-operation
Council of Europe
Strasbourg
1966

ED 000 223

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Each volume is published in English and French. The French edition of the present study is entitled:
L'emploi de la télévision en circuit fermé dans l'enseignement technique

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INTRODUCTION

The holding of periodical Council of Europe-sponsored meetings to enable educationists in member countries to become acquainted with the latest developments in educational television and study new uses for it was proposed at the first course held by the Organisation in 1961 in Paris on the use of television in teaching.

Following up this recommendation, the Council for Cultural Co-operation — the organ of the Council of Europe responsible for educational and cultural co-operation — arranged for a seminar to be held in London in 1964, on modern language teaching by television.

With a view to arranging a second seminar, contacts were established, through the European Bureau for Youth and Childhood (EBYC), between the Council of Europe and the Provincial Institute of Technical Education at Seraing (Province of Liège, Belgium) where a "Study Centre on Closed Circuit Television in Technical Education" has been in operation since 1961.

The subject chosen was "The use of closed circuit television in technical education" and its chief aims were defined as follows:

1. **to demonstrate at European level the various uses of a comparatively new medium — closed circuit television — in technical education;**
2. **to show that the medium can be used simply and economically, and can be adapted to a wide variety of circumstances;**
3. **to show how this new technique can aid the teacher in his increasingly difficult task with ever larger numbers of students;**
4. **to encourage teachers to "re-think" their teaching methods in the light of television, re-examine the subjects they are trying to teach and consider ways of using the new aid in the classroom;**
5. **to bring together experts on closed circuit television and persons without experience of it, so that:**
    - **— the former may exchange results of national experiments and compare ideas;**
    - **— the latter may be introduced to the new technique.**

The seminar was held from 6th to 10th April 1965 at the Seraing Provincial Institute of Technical Education; it was organised by the EBYC and the above-mentioned Study Centre with the assistance of the Council of Europe and the Permanent Deputation to the Provincial Council of Liège, and in collaboration with the Directorate General of Technical Education of the Province of Liège.

Direction of the seminar was in the hands of a committee of European experts who had likewise seen to the preparatory work. The Chairman of this Steering Committee was Mr. H.J. Edwards (United Kingdom); Professor R.E. Strivay, Secretary General of the EBYC, was in charge of organisation. Delegates from twelve member States of the Council for Cultural Co-operation took part in the seminar, which was also attended by observers from various countries and a large number of teachers *from the host country*[1].

The seminar was opened by Mr. G. Laboulle, Permanent Deputy and Chairman of the Administrative Board of the Provincial Institute of Technical Education, Seraing.

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[1] **See Appendix C for lists of members of the Steering Committee, participants and observers.**

At the opening session Mr. H. Boets, Director General of Technical Education of the Province of Liège, gave an outline of the pedagogical research carried out by the Institute and stressed the value of the seminar in that context.

The seminar consisted of general lectures alternating with demonstration and discussion of sample lessons.

A list of subjects for the lessons had been proposed by the Steering Committee, including aspects of physics, electronics, mechanics and metallurgy. Demonstrations dealt with the preparation of these lessons (including their animation), the conditions of recording or transmission, and possibilities of utilisation in class. Each demonstration was followed by discussion.

The general lectures gave participants detailed information on the most important experiments conducted in Europe, in particular at the Seraing Institute, in the United Kingdom, in France and in Sweden. In addition, each of the delegates of the other nations represented made a statement on work being done in his country.

These papers, together with the summary and conclusions of the seminar, form the subject-matter of this publication.

As regards the practical demonstrations, production and utilisation documents for one of the lessons are appended, by way of example, to the report on "Methodology" prepared by the Seraing Institute.

MAIN REPORTS

Experiments conducted at the Provincial Institute of Technical Education, Seraing (I)

GENERAL ASPECTS

Lecture by
Mr. L. Radoux, Inspector
of Technical Education of the
Province of Liège

1. GENERAL BACKGROUND TO SCHOOL TELEVISION

In July 1960, the Organisation for European Economic Co-operation published an important report by Mr. Henri Dieuzeide on television in secondary schools in Western Europe and possibilities for using the medium to meet new needs in science teaching[1].

Various basic questions dealt with in the report clearly raise the problem of a major educational research undertaking. It is necessary not only to find ways of fitting television into the educational scheme but also to foresee how teaching must develop in terms of the technical potentialities of this new medium, considered as an audio-visual aid.

How far could a fairly large school provide a valid answer to this problem? To which specific aspects should its investigations be confined? Could concrete, exploitable results be obtained with limited human and material resources? All these questions confronted the technical education authorities of the Province of Liège in approaching the problem of school television.

First of all it was necessary to plot the position of a school and the experiments it could conduct in terms of the various types of school television:

1. Open circuit school television broadcasting from public transmitters is at present employed in several countries. According to the above mentioned report, it has two distinct — and largely irreconcilable — functions:

(*a*) Background information, or "enrichment", which consists of supplying to existing schools, during class hours, documents and information otherwise inaccessible to teachers and pupils as a complement to the usual curriculum.

(*b*) Direct teaching by television, which systematically broadcasts courses for an audience of school age. In this case the television method completely replaces conventional educational structures, in order as a rule to make up for the lack of qualified teachers.

In short, let us say that open circuit school television may be either an "enrichment" or a "substitution" factor.

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[1] H. Dieuzeide — Teaching through Television — A report on teaching science by use of television in schools. OEEC-OECD, 1960.

2. Closed circuit television consists in transmitting pictures to a chain of receivers linked by coaxial cable with a central studio. This system can be used directly by schools for various purposes:

(*a*) Closed circuit television can be used for transmitting a teacher's lesson where pupils are too numerous and overflow into more than one classroom. This in our view is merely a palliative justified only where competent teachers cannot be found.

(*b*) At the Lille teacher training college we witnessed a lesson given by a young trainee; he was alone with his class, while professors and fellow-students watched on television screens in an adjoining room. This seemed to us an interesting use of the medium because it allowed of analysis and criticism of the lesson while trainee and pupils remained in their natural environment[1].

(*c*) But where closed circuit television really comes into its own is in practical lessons where close-ups are necessary for the students to get the most out of the experiment or demonstration.

Closed circuit television has been employed in this way in the teaching of medicine and science, to transmit experiments from laboratories.

This brings us very close to the problem of technical education and that is the field in which we wanted to try out the potentialities of teaching by television.

2. PURPOSES OF THE EXPERIMENT

First of all, the main purposes of our experiments: generally speaking, we were looking for the answer to a question which at first sight may seem comparatively simple.

Can satisfactory teaching be done by means of closed circuit television with only a limited supply of personnel and equipment?

To answer this question we had:

(*a*) to determine which subjects are most suitable for televised teaching and plan a form of lesson to make the fullest and most effective use of the television medium;

(*b*) to decide on the minimum of standard equipment and personnel needed;

(*c*) to work out methods appropriate to the potentialities of television and the requirements of productive education.

2.1. CHOICE OF SUBJECTS - PLAN OF LESSONS

Since we were enquiring into the use of closed circuit television in the context of a school with qualified staff and adequate teaching equipment, we proceeded from the assumption that television would be used to supplement direct teaching, as an audio-visual aid capable of increasing the productivity of our instruction.

Hence, we did not attempt to use television for French, history or mathematics courses where the teacher and the blackboard plus the normal audio-visual aids appear to us to suffice.

On the other hand we did endeavour to incorporate television into the teaching of two groups of subjects which seemed to us particularly suited to the medium.

1. Experimental science and technical subjects such as physics, applied mechanics, electricity and vocational technology, can benefit from the use of closed circuit television.

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[1] See also Appendix A.

Obviously conditions are not always ideal for presenting experiments, demonstrations and descriptions of tools and equipment even in front of a class of only 20 or 30 pupils. Experience was to prove that in this case the television close-up method is far superior to the showing of even the best of slides.

2. But it is in yet another field that television has proved the most valuable supplement to direct teaching; we mean the subjects essential as the background of practical operations, like time and motion study, in other words applied technology.

It is well known that correct movement in manual operations is one of the most difficult things to teach. If he is lucky, the teacher will have a well-fitted workshop, but that does not mean that every pupil is ideally placed to see what is going on. The teacher has to move from bench to bench, repeat his explanation or demonstration for each pupil separately, correct faults of posture... What a waste of time! Here, too, the close-up technique is indispensable for breakdown, analysis and instruction in work movement.

Having selected the subjects where television teaching was desirable, the use of the medium had then to be fitted into the structure of the lesson. We tried two solutions:

(i) At a stage which can be regarded as rudimentary, television will merely be an "extra" at a given point in the lesson (e.g. one can "show" the class a document or a preparation, a machine part etc.). The camera, set up on the teacher's desk, is used here in the same way as an episcope which involves neither technical problems nor pedagogic research though yielding remarkable results.

(ii) The real problem being the programming and utilisation of televised lessons, we then decided to give 50-minute lessons on the following rough plan:

(*a*) A televised part comprising the motivation and development of the subject-matter: 25 minutes;

(*b*) A conventional part to include the utilisation of the material provided by television, exercises on it, checking on intake: 25 minutes.

Until recently, the programmes were transmitted "live" from the studio where the teacher was, possibly accompanied by an assistant or two when needed to help with demonstrations or handle props. During the televised part the pupils are in the viewing room, in the charge of another teacher or a supervisor.

Now we have a video recorder at our disposal which makes it possible to pre-record lessons for subsequent projection. The flexibility resulting from this procedure will be readily appreciated: a teacher can prepare his television lesson outside normal class hours and be present with his pupils when it is presented.

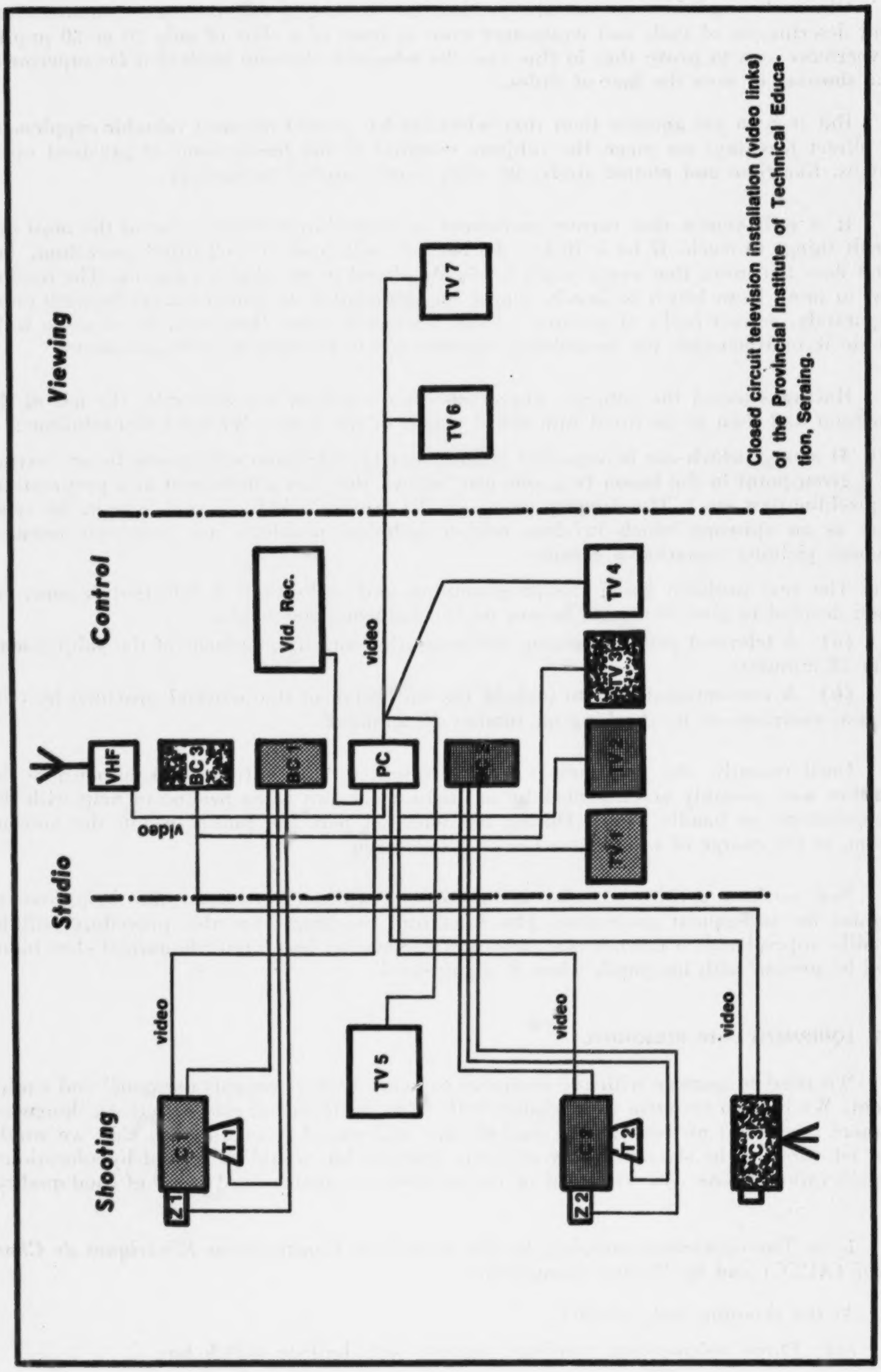
2.2. EQUIPMENT AND PERSONNEL

We tried to manage with the resources to hand, both as regards personnel and equipment. We had no recourse to specialists either for the technical side (directors, designers, camera operators) or the teaching staff. It was understood from the start that we would not let ourselves be sidetracked by aesthetic interests but would be guided by educational considerations alone. All we asked of the method was pictures and sound of good quality.

1. — *The equipment*, supplied by the *Ateliers de Constructions Electriques de Charleroi* (ACEC) and by Philips, comprises:

(1) At the shooting end (studio):

(*a*) Three independent transistor cameras with built-in switch box.


Shooting
Studio
Control
Viewing
Z 1
C 1
T 1
Z 2
C 2
T 2
C 3
TV 5
video
video
video
video
video
VHF
BC 3
BC 1
PC
BC 2
TV 1
TV 2
TV 3
TV 4
Vid. Rec.
TV 6
TV 7

Closed circuit television installation (video links) of the Provincial Institute of Technical Education, Seraing.

(*b*) Two remote control zoom lenses.

(*c*) Two remote control pan and tilt mechanisms.

(*d*) Three tripods, mounted on rubber wheels (dollies).

(*e*) One receiver with 60-cm screen, on which the teacher can inspect the picture actually transmitted to the receiving room.

(2) At the control end (studio):

(*a*) Two camera control consoles comprising:
  (i) Electronic camera controls (target - concentration - beam).
  (ii) Remote controls of the zoom lenses.
  (iii) Remote control gear of the pan and tilt heads.
  (iv) Connectors.

(*b*) A control console containing:
  (i) A three-push-button camera selector switch.
  (ii) An oscilloscope, with current supply.
  (iii) Connectors.

(*c*) Four 43-cm monitors fitted with anti-glare shades.

(*d*) The video recorder.

(iii) At the viewing end (receiving room):

(*a*) Two 60-cm receivers.

(*b*) Semi-aerated 75-ohm coaxial cables linking viewing room to control desk.

Studio lighting consists of a bank of fluorescent tubes and spotlights. This lighting is too inflexible, however, and the addition of mobile light sources is needed, to be used as required for sharper relief, illuminating specific objects, defining areas of brightness, lighting high-angle or low-angle shots etc. A battery of Fresnel lens spotlights, trolley-mounted on castors, would be especially useful.

The capital value of the equipment totals some 750,000 Belgian francs.

2. — *The problem of personnel* had our most careful attention since it was manifestly out of the question to attach a large team permanently to the work as that would have meant a disproportionate drain on the Institute's operational departments.

After the inevitable starting-up and running-in period when technicians were needed for getting the apparatus ready, what is the strict minimum of staff necessary for producing and presenting a television programme?

The lesson is prepared by the teacher together with the technician attached to the studio.

This technician will be at the camera control desk during transmission or pre-recording of the lesson. At that moment the teacher will be alone in front of the cameras, except in the case of certain lessons which call for an assistant. If the lesson is transmitted live, the class should be in the charge of a supervisor, who may be connected with the studio by intercom. If the lesson is simply pre-recorded for subsequent projection, the supervisor is, of course, not needed.

Finally, it is clear that the presence of a technician well versed in studio technique and the handling of the cameras is indispensable.

If we assume that the use of the video recorder will tip the balance in closed circuit television in favour of tape recorded programmes, a second person will very rarely be needed to assist the teacher. It will be agreed that this represents nothing extravagant and that the possibilities are well within the reach of all largish schools.

2.3.

Our closed circuit television trials were designed to enable us to sort out a number of criteria and ideas as to methods in televised education. It would be presumptuous on our part to claim that everything has been done in this field; on the contrary, we find that we have only glimpsed a field of exploration where the ground yet to be covered and the discoveries to be made are vast. Be that as it may, the report on methodology will afford us an opportunity of considering these fascinating problems. But before that I would like to talk to you about a question of no less importance, namely the adjustment of teachers to televised education.

3. ADJUSTMENT OF TEACHERS TO TELEVISED EDUCATION

3.1.

Although audio-visual aids are, generally speaking, well received by the technical teaching profession, it might be thought hazardous to launch an experiment in closed circuit television without preparation.

And, in fact, before we started our experiment, there was little or nothing in the way of guidance available.

Mr. Dieuzeide's report, already quoted, mentioned the experiment at the Sèvres Lycée where a closed circuit system had been installed in order to work out new techniques for the teaching of mathematics by television. Our Deputy Principal, Mr. Etienne, was sent to Sèvres to gather information likely to help us in our task.

On the technical and equipment side, the particulars we received helped us considerably in choosing the essential material and deciding how to use it.

On the other hand the aims of the Sèvres experiment were quite different from ours, and it was at once obvious that, from the educational point of view, it could only provide us with certain general ideas:

(*a*) Length of lessons: maximum half an hour of television; 20 minutes is the ideal.

(*b*) Density of course: the matter presented by television in a given time appears less concentrated than for conventional teaching.

(*c*) Pace: depends on the content of the pictures and the age of the viewers. It can be adjusted to the commentary but also reacts on it.

(*d*) Commentary: should be slower and simpler than during a conventional lesson. The commentary should follow the picture — show first, then talk.

That was the lot. We had neither a teacher training institution to call on, nor a school television service, nor an audio-visual laboratory.

3.2.

But we did have a team of volunteer teachers who were prepared to conduct the experiment in addition to their regular jobs, to design lessons, to stand in front of the cameras, and to submit their work to criticism.

Fifteen teachers agreed in this way to take part in the trials. We therefore selected a number of lessons which we considered suitable for television. First the teachers prepared their subjects on conventional lines, endeavouring to draw as far as they could on intuition and experimentation.

The second phase consisted in transposing the elements of conventional preparation to the circumstances of the experiment, seeing that the complete lesson was to comprise a televised part and a "traditional" part in which the utilisation would take place.

The televised part alone demanded preparation by way of arranging the matter in televisual form which called for lengthy discussion between teachers and studio technicians. A script had to be made which would maintain close synchronisation between teacher and camera team. Apart from this, hundreds of details regarding the presentation of the subject-matter, the exposition and presentation by the teacher, were meticulously worked out.

At the beginning of the experiment, when we found that eight to ten hours of gruelling work were needed to prepare twenty to twenty-five minutes of televised lesson, we had doubts as to whether the closed circuit television medium could be applied to our normal activities.

But progress was rapid. Preparation and rehearsal took less and less time, and we even had a successful stab at transmitting lessons unrehearsed.

But obviously, and this must be emphasised, such a result can only be achieved with experienced staff — teachers and technicians alike — working from a carefully prepared script.

3.3.

The meticulous, detailed preparation needed for teaching by television convinced us that this experiment constitutes a quite extraordinary training in teaching theory and method.

The elaboration down to the minutest details and the numerous rehearsals demanded by televised teaching made all the masters aware of the shortcomings in their conventional teaching. From this aspect, the use of the video recorder for recording and retransmission of the lesson proved an incomparable instrument. Perhaps for the first time, the teacher had a chance to see and hear himself with the eyes and ears of the pupils. He could engage in constructive self-criticism, leading to improvement which he would be able to follow up and verify just as often as he pleased.

A point to be noted (and all the teachers who took part in the experiment are unanimous over this) is that a teacher facing the camera immediately senses any static moments in his performance — much more so than during a conventional lesson. Television has no room for pauses, for long-drawn-out picture sequences, for padding. The eye of the camera is more awe-inspiring than that of the most fearsome inspector. This doubtless explains the enormous progress made by all the teachers between one transmission and the next.

One thing is certain: television is no more a miracle-worker than other audio-visual media. Its value, like all methods and all techniques, is that of the person employing it. But it is terribly exacting. On the other hand, it imparts an outstandingly solid "skill" and thus appears as an incomparable instrument for teacher training. When a teacher shows a film, he is passive, falling in with the work of others. But in television he has to give himself completely, to do everything, employ all his resources in this great adventure in education. And we were moved when we saw young teachers emerging very happy from their experience, having become aware of their true potentialities and tasted of the profound joy of those who have achieved the level of teaching as an art.

It needed courage to agree to take part in school television experiments. And to succeed meant sparing neither time nor effort.

4. ASSESSMENT OF AN EXPERIMENT

4.1.

In defining the scope of our experiment we wished to demonstrate that closed circuit television could be perfectly well incorporated in direct teaching, using only limited resources within the means of a large school.

However, the next question goes right to the heart of the problem: is closed circuit television a viable proposition?

The answer to that question must be twofold, from the standpoint of the teachers and from that of the pupils.

We have already shown that we regard closed circuit television as a unique instrument for further training of teaching staff, and we need say no more.

But what of the taught? I will leave it to Mr. Ista, psychologist and Deputy Principal of our Institute, to discuss practical results, psychological considerations and pupil behaviour, and confine myself to emphasising some of the conclusive benefits of television:

(*1*) All pupils are equally well placed to see properly, wherever their desk may be.

As Alexander King so succintly put it, television provides each student with a front-row seat[1].

(*2*) Television enables the teaching to be more quickly assimilated and more easily memorised because of the visual emphasis. "Wherever it has been well used, television has proved a stimulus for the activities of the classroom; it has improved the general atmosphere and been a tonic for the mind. Far from standardising teaching practices, television seems to encourage diversity and originality in schools."[2]

(*3*) While the eye is constantly occupied, the pupil sees only what the teacher wishes him to see — hence greater concentration. This heightened receptivity is an enormous advantage.

For attention can be "concentrated" on or "directed" to

(*a*) each detail or each stage of an operation,

(*b*) the three fundamental constituents of the lesson: the teacher, the experimental equipment and the supporting diagrams, each being shown in close-up at the right time.

These three conditions of success cannot be fulfilled in ordinary classrooms, since the pupil who is lucky enough to have a good seat always sees the whole teacher-equipment-diagram complex while another pupil, though better placed for sound, actually sees little or nothing.

4.2.

The next few days will provide opportunities for discussing the various aspects of teaching by television — pedagogic, methodological and psychological. But I would like here and now to stress that an enormous field of investigation awaits the researcher wishing to explore it. We are as yet in the first fumbling stages of closed circuit television techniques and there are many problems of closer study. For example:

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[1] *Op. cit.* Foreword.

[2] *Op. cit.* paragraph 71.

(1) *The elaboration of a rational technique of utilisation*, comprising:

(*a*) Determination of methods of production: forms of transmission, structure, presentation techniques, frequency of recurrence.

(*b*) Determination of methods of utilisation (*exploitation*), relations with normal school activities.

(*c*) Assessment of influence on teachers' work.

(2) *The evaluation of the effectiveness of the teaching by scientific analysis of results.*

The experiments should deal for a whole school year with one or two subjects particularly suited to televised teaching. There should be two similar classes at the same level:

(*a*) one to serve as a pilot group with television used in teaching;

(*b*) the other as control group, continuing to be taught by traditional methods.

Various tests should be designed for measuring the real efficacy, studying "comprehension" factors of the audio-visual message and determining how that message can be adapted to the capacities of the pupils.

(3) *The study of the psychological reactions of young persons to closed circuit television.*

So there is no lack of material for enquiry. It is our hope that we have added our stone to the educational edifice of the future and we should like to think that, in company with others, we may go on modernising education in order to achieve greater productivity from our schools.

Experiments conducted at the Provincial Institute of Technical Education, Seraing (II)

METHODOLOGY

Lecture by
Mr. L. Radoux, Inspector
of Technical Education of the
Province of Liège

For a number of years now, audio-visual aids have assumed increasing importance in education. Many are the teachers who now make use of tape recorders, diascopes and motion pictures.

But, while rejoicing that teaching staffs have endeavoured — with more or less success — to employ audio-visual aids and to exploit their potentialities for the improvement or modernising of traditional teaching methods, we regret the empiricism which still reigns in the use of mass media.

The need both for a concerted policy and for research into the psycho-pedagogic consequences bound up with the use of audio-visual techniques increases in urgency with the growing complexity and advances in those techniques. To fall short in this respect may have the serious consequence of restricting or retarding the application and exploitation of the new methods when all material difficulties have been solved. And therein perhaps lies the explanation of the fact that television was not immediately apparent to the teaching profession as a particularly apt medium for improving and, indeed, transforming teaching practice.

From our closed circuit television experience certain basic rules emerged which, when applied in evolving new lessons, enabled us to avoid the pitfalls encountered in the beginning.

We make no special claims for these rules, observations and "recipes" which will be described to you; they can only serve as a starting point for more thorough research with a view to elaborating a methodology of teaching by television.

1. CHOICE OF LESSONS

The first problem confronting a team of teachers in studying the viability of televised education is to choose the sorts of lesson which can suitably be arranged for television.

In our first approach, we rejected straight away those subjects whose presentation is in general purely static, e.g. literature and mathematics.

Next we explored the range of our scientific and technical courses whose content seemed to offer special possibilities for television. But here, too, we had to select. Deliber-

ately setting aside lessons which could be adequately eked out with slides, we restricted the application of television to two types of lesson:

(1) Those requiring presentation of an experiment, material or apparatus which cannot be properly displayed in ideal conditions to a class of thirty, some of whom are seated seven or eight yards from the teacher. In lessons of this type the advantage of television resides essentially in the use of close-ups, enabling every detail to be seen by the whole class.

(2) Those calling for "dynamic" presentation of the matter or apparatus.

In this latter case, the aim of television is essentially to reproduce motion and to analyse it down to its smallest detail. It matters little for the moment whether this motion is:

(*a*) an indispensable complement to the description and understanding of a physical phenomenon, or

(*b*) a movement associated with setting up apparatus or assembling a machine or with a workshop operation.

Accordingly, we decided to confine the use of television to lessons calling for *close-up display of material* or for *motion study*, or both — since they may occur either simultanously or in succession during one and the same lesson.

Before embarking on our closed circuit experiments, our programme covered thirty-two lessons. As the trials proceeded we were led to modify and even to eliminate some lessons, and in the event we produced twenty-three complete transmissions, as follows:

4 lessons in physics,
1 lesson in electricity,
2 lessons in electronics,
1 lesson in general mechanics,
2 lessons in applied mechanics (internal combustion engine and physical measurement apparatus),
2 lessons in metallurgy,
2 lessons in machine-tool technology,
5 lessons in welding technology,
4 lessons in time and motion study.

In the light of the information gathered we have been able to define a policy for the closed circuit television from which three forms of utilisation emerge, according to the type of lesson and its purpose, namely:

(1) Shots in classroom or laboratory;
(2) The "flash technical sequence";
(3) The televised lesson.

(1) LABORATORY OR CLASSROOM SHOTS

In this application, television is simply used like an episcope; the camera is set up on the teacher's desk and enables his equipment or graphics to be shown in close-up.

Used in this way, television is thus inserted into the conventional lesson; but even though limited in its educational intent, this method already yields remarkable results, while calling for neither specialist personnel nor cumbersome equipment.

To give one example: a metallurgy lesson was given using this equipment to show micro-photographs of steel samples, with the camera attached to the microscope.

In the conventional lesson, the micrographs are displayed by the projection of photographs or by direct observations at a metallurgical microscope. The disadvantages of this type of lesson are that:

(*a*) The images projected are "static". They do not allow of systematic exploration of a sample so as to demonstrate the continuity of structure throughout the test piece or alternatively the differences in structure which occur at different points as in certain steels (case-hardened test bars, surface tempering, insufficient penetration of tempering).

(*b*) Pupils are sceptical of the complete reality of the images when photographs are projected. The sight of the actual sample is more suggestive and far closer to micro-analysis as practised in industrial laboratories.

(*c*) Direct observation by each pupil at the microscope takes too long to be feasible in a normal class. Moreover, the teacher cannot verify what the pupil sees nor draw attention to individual details.

Use of the camera can remedy these drawbacks while presenting the advantage of direct application and active teaching based on the give-and-take between teacher and taught.

(2) THE "FLASH TECHNICAL SEQUENCE"

The "flash technical sequence" produced in the studio and possibly recorded for projection during the lesson generally comprises 10 to 15 minutes' transmission.

The chief object is to show in close-up material or apparatus the details of which cannot be seen by all pupils in the classroom or workshop.

The "flash technical sequence" is normally inserted into a conventional lesson on a technical subject without basically changing the content or the utilisation under the teacher. In this respect it can thus be compared to a documentary film with the teacher using school equipment which — be it said in passing — already has one advantage over the educational film in that it presents a subject in the pupils' natural surroundings.

In the workshop, too, the teacher can employ the "flash technical sequence" to show a piece of equipment, or, better still, a given *modus operandi* in optimum conditions for all pupils to see and hear.

In fact what we have dubbed the "flash technical sequence" is a process still entirely based on the theory of demonstration. It is a first step in the direction of a televised lesson of which the structure, organisation and utilisation by the teacher will be far more elaborately programmed.

(3) THE TELEVISED LESSON

From the "flash technical sequence" we move on to the televised transmission where the part played by television assumes such importance as fundamentally to modify the structure of the lesson.

And let there be no mistake; when we speak of the importance of the televised part we do indeed mean the influence it may have on the organisation and the utlisation of the lesson and not simply the duration of the transmission. The latter should never exceed 20 to 25 minutes, otherwise it may overstep the "threshold of attention" beyond which the televised message is no longer absorbed by the pupil. The fact is that all conventional preparation of lessons has been profoundly modified in order to exploit the television medium, and it is no exaggeration to say that television is precisely the instrument which can, as Mr. Dieuzeide desired, exert "the psychological stimulus which can lead to radical changes in current teaching habits"[1].

As we have said, the lesson will consist of two sections:

(*a*) A televised section comprising the exposition and development of the subject-matter — about 25 minutes.

(*b*) A conventional section to include the utilisation of the material provided by television, exercises on it, and checking on intake — about 25 minutes.

Let us now analyse the information derived from our various trials.

2. OBSERVATIONS ON METHODOLOGY

2.1. REMARKS REGARDING THE TELEVISED SECTION

(1) ***Television calls for teaching,*** stripped down to essentials, both as to the pictorial and the spoken part.

The teacher has to plot his lesson minute by minute, which means selecting what is to be taught with the utmost care. In this way contact between pupils and new materials is more direct, more closely focussed on essentials. The commentary will be very spare, since it is only a supporting factor in television; attention should be paid to the links between passages of direct commentary on the pictures, and the padding of blank intervals with empty phrases or unnecessary repetition should be avoided.

The problem of vocabulary (or new words) merits careful study. The teacher in the televised part cannot spend too much time on explaining new terms without the risk of his lesson dragging; often he will have to confine himself to suggestion by demonstration. In these circumstances there is a danger of the words being misunderstood or not taken in. Therefore, the number of new words per lesson must be limited and they must be taken up again by the teacher of the conventional part.

(2) ***Television "speaks" chiefly in pictures***

Here we discover a fundamental difference between teaching by television and conventional teaching.

In conventional teaching, spoken and written words are the basic tools, and images (wall-panels, exhibits) are mere adjuncts.

In televised teaching, on the other hand, the picture is the thing and the commentary the adjunct. The choice and planning of the pictures therefore demands the utmost care. In other words, ideally, each televised lesson should be a coherent "anthology" of high-quality images, each of which must be right and convincing, leaving no doubt as to the intention behind it. It is no good trying to demonstrate that the surface of an unconfined liquid is horizontal by laboriously lowering a T-square along a plumb-line.

(3) ***On television, teaching must be "active" too***

Because the language used is pictorial, one trap the teacher can easily fall into is that of adopting the "descriptive" style. This is bad enough in conventional teaching of technical subjects and simply intolerable in the presence of the small screen, because attention flags very quickly if not constantly revived by something fresh.

Of course the teacher must "prune" his lesson but, above all, he needs imagination and ingenuity in devising inspired "shots", really suggestive demonstrations and experiments. In this way wearysome, hackneyed lesson schedules can be rejuvenated and modernised. This happened in the case of the majority of the lessons in our experiment.

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[1] Teaching through television — A report on teaching science by use of television in schools, paragraph 5.

No doubt the pupils, but also the adult viewers who followed our experiment, were always keenly interested — for it is exciting to be able to watch, in optimum conditions, well-chosen, startling pictures, and close-up details, displayed at just the right moment. But that in itself is not enough to bring lessons to life and ways have to be sought of arousing the sustained attention which stimulates the pupils to one-hundred per cent participation in the transmission to the point of triggering off reactions and even answers (as we found on several occasions) to questions put by the teachers.

Nor must commentaries on static images be overdone.

Thus a lesson on radio transmission consisted of two main stages:

(*a*) The first stage showed a wire relay, with reception by means of the television receivers, followed by a micro wave link, with reception by portable sets in the receiving room, the television receivers being cut out at that moment.

These experiments, which were highly successful, were in the nature of a live reportage and the pupils were fascinated. This first part illustrates the ideal climate which one should seek to maintain throughout a televised lesson. At that instant, the pupils participate intensely; one may truly say they take an "active" part.

(*b*) The second stage consisted in a description and explanation of the working of a radio installation which the pupils were shown fully assembled. Thus they were no longer directly involved, they were called on to remain passive.

The question ought to have been put thus: "How would you construct a transmitter?" The teacher would then, after explanations quoting the exact scientific principles involved, have proceeded to construct the transmitter, demonstrating experimentally the function of each part. That procedure would have applied the method of rediscovery, adapted, of course, to the subject in hand.

(4) Since the teacher "speaks" in pictures, he must be *constantly concerned to develop the faculty of observation and visual awareness in particular.*

(*a*) Frequent comparisons must be made, with the terms of the comparison set out distinctly.

(*b*) To facilitate identification, comparison, determining ratios and formulating propositions, orders of magnitude must be cited as often as possible.

We have to remember that the camera presents a series of images incessantly varying in scale, with sequences of normal pictures and close-ups succeeding each other. These changes of scale, of magnification, are necessary for the full exploration of the subject-matter; but they might distort the pupils' judgment if the teacher were not constantly at pains to supply standards of reference.

(5) To *avoid eye-strain* and *flagging attention,* the camera must sometimes switch to the teacher and the blackboard (or flannelgraph etc.). Television demands lessons reduced to the bare essentials, as we have seen. But the result is a highly condensed televisual message which quickly becomes fatiguing unless broken by sequences which momentarily interrupt the sustained attention needed to follow the demonstration or description of material. Hence the need for an occasional close-up of the teacher or the blackboard. And that is the right moment for stressing a detail, drawing a conclusion or making a partial summing up of the lesson. A cleverly contrived transition will direct attention back to the subject-matter for the rest of the demonstration. Technically, moreover, such sequences may be necessary to permit the operator to move the cameras before proceeding to the next stage of exploration of the material.

2.2. OBSERVATIONS REGARDING THE CONVENTIONAL SECTION

(1) *The conventional section should utilise the matter provided by the televised section*, amplifying the ideas shown on the screen and checking how far they have been retained.

But the teacher must effect a real synthesis, the scheme of which will be built up on the blackboard as the lesson proceeds. In other words, preparation of the lesson should include the way it is to be plotted on the blackboard. Moreover, the conventional section should end with short exercises to check the pupils' intake.

(2) *The transition from the televised section*, when the pupils are in a darkened room and physically passive, to the conventional in a lighted room, when they must at once become active again, is crucial.

The teacher responsible for the conventional part of the lesson must begin by shaking up his class with a few moments of extreme hustle (e.g. a volley of questions). Above all he must not begin with definitions (Lesson: Shrinkage in welding — "What is expansion? What is shrinkage?"). Questions like these freeze the class — we all know how pupils detest reciting definitions.

On the contrary, there must be *constant reference to the imagery of the televised section*.

Example. The teacher shows the class a metal sheet. He says: "I heat this. What happens?" The class answers "It expands". The teacher then asks for examples from the televised section (constant exercise of visual memory).

Or again, the teacher reminds the class of the distortion of a metal sheet when heated at the centre, strikingly demonstrated by television. Then, referring to this concrete case, he will ask: "Can this metal sheet be straightened? And how?" In this way the pupils are led step by step to discover for themselves the facts the teacher wants them to discover.

These two observations illustrate an important basic principle.

The conventional part should:

(*a*) act as *a check* on the televised part by constantly drawing on memory of the images displayed;

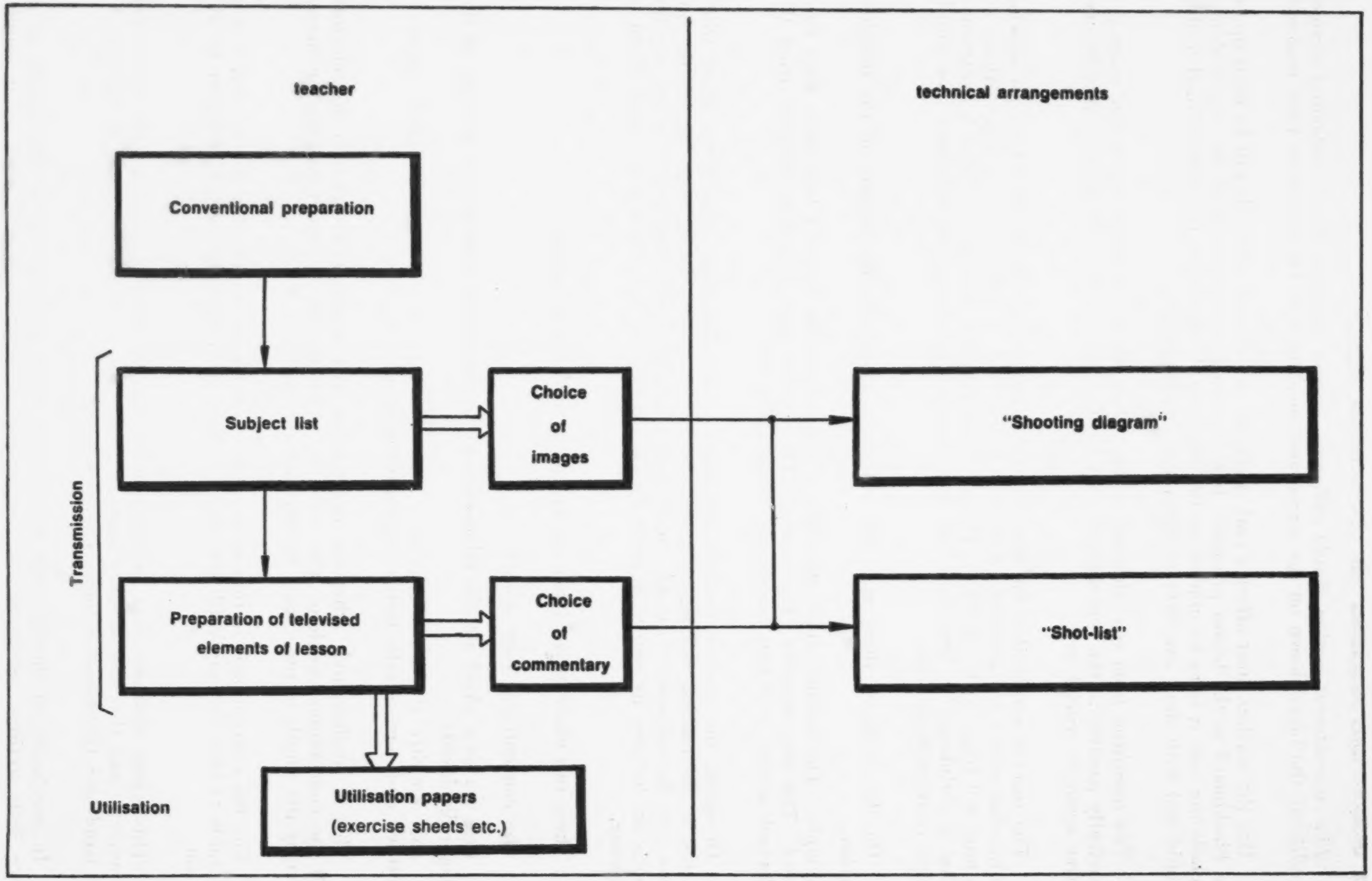
(b) *amplify* the ideas televised, with emphasis on those which afford concrete, intuitive and particularly fertile supporting matter.

This is fundamental, otherwise the teacher will create a rift between the televised and the conventional sections. The difficulty to be overcome is that of utilising the images seen by the pupils in some cases twenty minutes earlier.

For the conventional section to go with a swing, our experience showed that it was desirable to have the pupils fill out exercise sheets specially designed in relation to the lesson.

This again confirms that preparation or lessons should always include utilisation documents, and that the working manual directly keyed to the teaching is superior to the handsome traditional volumes on the market.

In conclusion, it should never be forgotten that the planning of the lessons must cover both sections, televised and conventional. Since television is used as an audio-


teacher
technical arrangements
Conventional preparation
Subject list
Choice of images
"Shooting diagram"
Transmission
Preparation of televised elements of lesson
Choice of commentary
"Shot-list"
Utilisation
Utilisation papers (exercise sheets etc.)

visual aid, the two sections do not necessarily have to be of equal duration. It is in fact advisable to cut down the televised part; the objectives of the lesson as a whole constitute the sole determining factor.

3. PREPARATION AND PRACTICAL ORGANISATION OF THE TRANSMISSION

The above preliminary remarks will have demonstrated what criteria guided us in the choice of lessons suitable for closed circuit television. Now let us see how the transmission can be prepared and organised.

3.1. PREPARING THE LESSON

It is useful if the teacher first of all prepares his draft as for a conventional lesson, although even at this stage drawing as far as possible on intuition and experimentation. Then must follow a detailed analysis of those parts of the lesson which call for presentation and utilisation of teaching equipment. It is here that the inadequacies of traditional methods will frequently make themselves felt: difficulties of demonstration and a too "static" exploitation of equipment.

Then, if one has any experience of televised teaching, it is not too hard to imagine the sequences needed to present the equipment or the experiment on the small screen.

However, that is by no means the end of the difficulties, for the main part of the preparation remains to be done. It must be remembered that the television lesson consists of two distinct parts, one purely televised section, the other devoted to the utilisation of the matter supplied by the former.

Accordingly, the whole "scenario" of the lesson has to be re-examined in the light of the methodological principles defined above.

For the televised section, the teacher will now draw up two essential papers — the text of the lesson and the script, intended for the operator, which comprises a sketch-list of the sequences to be shot and the camera movements involved ("shot-list")[1]. This rough script will be tried out and adjusted in the studio until a satisfactory result is obtained.

Studio preparation generally begins with working out the pictorial sequences relating to the matter to be presented ; lighting, camera positions and shots are meticulously calculated to produce as nearly perfect an image as possible.

The second stage concerns synchronisation of words and pictures and the linking of the various sequences in the transmission — a tricky job on which the homogeneity of the lesson will largely depend.

Only when all these details have been satisfactorily settled can the "dress rehearsal" be attempted. It is as well to record this for detailed analysis.

But the preparation of the lesson must also embrace the conventional section. We have already mentioned how important this is for the utilisation and control of intake; that is why we ask the teacher to plan its progress with great care and to pay particularly close attention to the papers to be distributed to the class [1].

This lengthy work of preparation has yielded a mass of practical information which it may be of value to place before you.

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[1] See samples attached to this report.

3.2. STUDIO PROCEDURE

(1) *The teacher* must be a good actor, and as natural as possible. In most cases he can usually work seated — the pupils will not know, since he will be shown in close-up. The teacher is thus very relaxed and can with ease be perfectly framed in the picture. His shirt must not be dazzling, nor must he have a fountain pen or propelling pencil in his breast pocket. His suit must be all one colour. For preference he should wear a dust-coat. Behind him will be placed a grey cloth screen.

(2) *The microphone* was first located on the lapel. The teacher's movements — whether standing or sitting — sometimes disconnected the microphone. We next tried slinging it round his neck — which was better, but the mike sometimes touched against things and unscripted sound effects resulted. We then decided to suspend the recalcitrant object above the teacher, and this was crowned with success. The quality of the sound remains excellent, extraneous noises are eliminated and the teacher is rid of the leads which had an awkward habit of becoming entangled with his feet and legs.

(3) *Lighting* must be adaptable, in order to present settings which give good-quality pictures.

It is therefore necessary to have not only graduated lighting but also mobile or at any rate easily shifted studio lamps, which moreover permit of high-angle or low-angle illumination. Care must also be taken to place the operator in an unlighted zone from which he cannot see the light sources. This position enables him to set the monitors more easily.

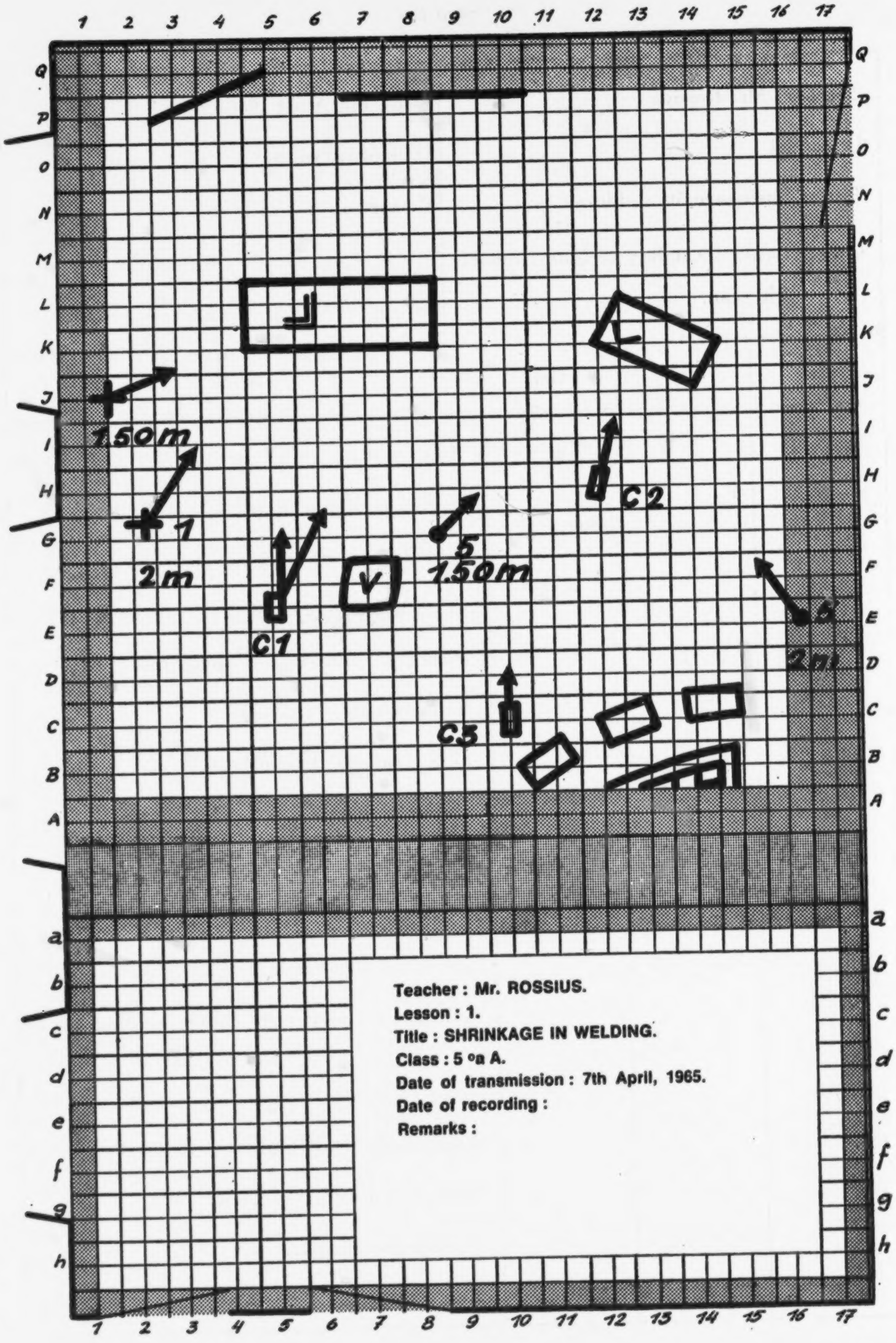
(4) *Arrangement of teaching material* in front of the cameras calls for great care. Much experience is needed in the choice of colours. It is a good thing to display objects at rest, well-defined against a pale green background. The distance between object and camera is important — if too close, the object will appear distorted, if too distant, details will not be visible. One has to know which angles to select in order to give the best pictures. The effect of movement of objects appearing in the picture must always be studied in advance. Many difficulties will be gradually overcome by trial and error. For instance, we found that the calibrations of the drums of machines were not easily distinguishable owing to reflection. All we had to do was to paste brown paper on the drums and mark the calibrations on the paper. The illusion is perfect and the calibrations are accurately detailed in close-up. Again, to render visible the water employed in physics experiments we had to use certain colouring matters. On the other hand, to make marks on metal castings clearly visible we had to coat them with lamp-black. There was a tricky problem involved in showing the flame of a blow-lamp, the welding bath and the parts being welded. By using smoke filters and suitable lens apertures, satisfactory results were obtained. There I will leave the recital of the thousand and one details which illustrates how fascinating these experiments can be.

(5) *Operating the cameras* also demands a degree of experience which is daily enhanced as the tricks of the trade are acquired.

3.3. PROCEDURE IN THE VIEWING ROOM

The viewing room is nothing but an ordinary classroom with two receivers. That number has proved adequate for a class of thirty-five pupils seated in four rows. It is essential to determine the optimum zone of vision and the minimum and maximum distance between pupils and receivers. Care must also be taken to ascertain how many receivers are required and how they should be placed, bearing in mind the size of the audience and the shape of the viewing room.

Where programmes are transmitted live, a telephone link between viewing room and studio is useful in order to supervise the transmission and get defects corrected as they appear.


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Q P O N M L K J I H G F E D C B A
a b c d e f g h
1.50m
1
2m
C1
V
5
1.50m
C2
6
2m
C3

Teacher : Mr. ROSSIUS.
Lesson : 1.
Title : SHRINKAGE IN WELDING.
Class : 5 ºa A.
Date of transmission : 7th April, 1965.
Date of recording :
Remarks :

"Shooting diagram"

"Shot-list"

Teacher: Mr. Rossius	**Date: 6th April 1965**
Lesson: 1	**Date of recording:** ....
Tittle: Shrinkage in welding	**Remarks:** ....
Class: Lower secondary technical school: 5th year	....

C.1	C.2	C.3	Mixing
×			title chart
		×	teacher + flannelgraph
	×		heated sheet of metal
×			sheet bent to angle-iron
	×		shrinkage soldering of angle-iron
		×	flannelgraph + teacher
			adjust camera 2 (lighting)
	×		marking operation
	×		welding operation
×			check of welded angle-iron
		×	teacher + flannelgraph
	×		welding of angle-iron (after welding at 3 points)
×			table of results
		×	flannelgraph + teacher
×			introduction of the exercise
		×	teacher (conclusion)
×			final chart

Exercise sheet

Provincial Institute of
Technical Education,
SERAING

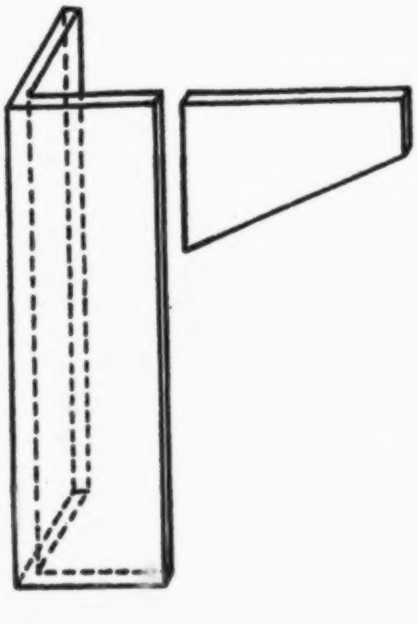
Lower Secondary Technical
School — 5th year

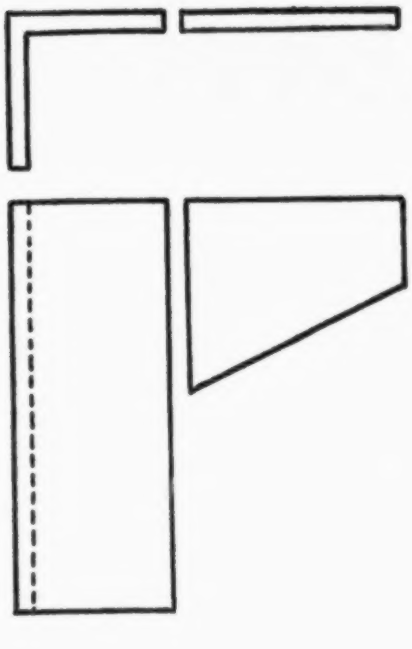
TV
Exercise
sheet

Shrinkage in welding

Exercise:

To weld a bracket on to an angle-iron: the edges of the two pieces must fit squarely together





Working method

Experiments conducted at the Provincial Institute of Technical Education, Seraing (III)

PSYCHOLOGICAL ASPECTS

Lecture by
Mr. J. Ista,
Deputy Principal of the Institute

One of the aims of the Provincial Institute of Technical Education at Seraing is to reach an objective assessment of the value of television in technical instruction, under certain clearly defined conditions. Hoping to strike a balance between enthusiasm and scepticism, we decided to combine our practical experiments with a theoretical inquiry whose findings will be set out in a report to be presented in 1965 to the Institute of Educational Sciences of Liège University.

Part of our inquiry consisted in sampling the views of our teaching staff on the use of closed circuit television for providing technical instruction. This was done by means of a questionnaire. It seemed to us important to learn the views — or even the first impressions — of our teaching staff on this new question because, psychologically speaking, from the very first moment he sees anything man forms some sort of judgement on it, and this often influences the general attitude. We all know how people cling to their first impressions, however contrary they may be to the real facts or even to their own subsequent experience, and little would be gained by a frontal attack on an attitude or impression unfavourable to the use of television in technical instruction.

I propose to use the replies received to our questionnaire, which are still being analysed, as a starting point for consideration of some of the psychological problems raised by the use of closed circuit television in this Institute.

As I say, we have not yet finished examining the replies either qualitatively or quantitatively, but I can tell you already that the general reaction is far from being unanimously favourable. The criticisms and explanations have brought to light a whole series of psychological aspects, and problems which call for careful consideration.

First, I think the resistance to the introduction of television apparent among many teachers is due to the fact that they themselves grew up, largely if not entirely, in a world which had never heard of television, radar, sputniks, electronics and the rest, the result being that there is a side of the modern child's mentality which eludes them while, to their pupils, they themselves seem to belong not just to a different generation but to a different era. This resistance is natural. After all, in their day, the introduction of printed books or blackboards must have roused similar suspicions among teachers who, in their own youth, had known nothing but the Socratic dialectical method. Whenever there is an attempt to introduce innovations into our schools the same resistance appears, whether to television, audio-visual methods, language laboratories, programmed lessons or teaching machines.

The feeling of resistance is intensified by a certain fear on the part of the teachers of finding themselves either totally or partially supplanted by machines. This sense of insecurity is very often, I think, actually created by the innovators themselves who are so convinced of the importance of their discoveries that they are apt to exaggerate the extent to which they can be used. Again, the new apparatus is so complicated that the innovators are largely technicians whose main interest is not education, so that they often fail to consult the educationists.

One serious problem, then, which is too often neglected, is that of briefing the teachers.

I am convinced that nothing will ever replace the physical presence of the teacher in a classroom and I would say too that no teaching method can ever compensate for the absence of skill, knowledge or psychological insight on the part of the teacher. On the other hand, whether we like it or not, the printed word is no longer today the only means of communicating ideas, and the pupils' grasp of their work can be both improved and made easier by such aids as language laboratories, programmed lessons, television or teaching-machines. These can be used to prevent verbal explanations being wrongly understood, save time and stimulate the pupils' demand for objective information. They clarify and elucidate the matter taught, help the pupils to memorise it and make it more attractive.

It has to be admitted that the most powerful educational forces in the modern world are to be found outside school and that one of them is television. That being so, teachers ought not to leave its exploitation solely to those whose main preoccupation is not education. Television is here to stay; we must make use of it and incorporate it, with all its magnificent possibilities, into our scholastic tradition.

Moreover, teachers cannot justifiably ignore the part played by television in the lives of the younger generation. From the psychological standpoint the complaint is made, often correctly, that school, with its own rhythm and rules, constitutes a world apart, unrelated either to that in which the child is living or to the adult world in which he will one day have to take his place. The longer schools take to adapt themselves to the new technique, the further they will grow away from the real world in which all this apparatus is in everyday use.

We can no longer shut our eyes to the large part that can be played by audio-visual methods in contemporary teaching. Until quite recently, the radio and the cinema were regarded as the most progressive of these because they do in fact offer a new approach to both the real and the abstract.

To my mind, television is to be regarded as in a way the pinnacle of the other audio-visual aids. It possesses the same advantages without certain of their drawbacks and, from the psychological angle, all the arguments in favour of the other methods apply to it too. Children, today, have become accustomed to assimilate information presented visually and, compared with the radio or tape-recorder, television, which reinforces the spoken word by the image, ought to attract their attention more easily, make a deeper impression and induce a greater degree of concentration. At first sight, television and the cinema would appear to be closely connected, and many people regard the former as an improved version of the film.

However, I think some psychological and teaching problems can be dealt with more easily by using methods peculiar to television. I mean such problems as how much instruction can be crammed into one lesson, what pace best suits the average needs of the class, the ideal use of the visual elements so that they are educative without becoming a source of distraction, how to choose the most suitable instructors. The great advantage of television over the cinema appears to lie in its greater flexibility. Using television, it is possible to vary the teachers and to make last-minute alterations in the presentation or content of a lesson, on the basis of the weekly progress registered by the pupils. Finally, a transmission is never out of date or overtaken by technical progress.

The interviews I have had with young people show that television is quite naturally supplanting the cinema because it is regarded as both more alive and more attractive. It seems to strike children as more spontaneous and more real than an ordinary film. They say they pay more attention to a "live" transmission, because there is no guarantee that the demonstration will be successful. Generally speaking, the televised lessons regarded by the children as the best were those in which they felt that the teacher had come up against difficulties in his experiments.

The following were the chief arguments against television in the answers to the questionnaire:

1. In television lessons the pupils are passive, whereas they learn nothing if they do not take an active part. They also tend to regard television lessons as of secondary importance and a form of recreation.

2. There is no personal contact between teacher and pupils. It is a one-way method of communication in which all the imponderables in the art of teaching are lost because there can be no exchange of question and answer.

3. The appearance of a teacher on the screen is apt to diminish his prestige with his pupils because he fails to stand up to comparison with the professional announcers to whom they are accustomed.

These are, of course, recognised objections to television teaching, although considerable doubt has been thrown on their validity since its adoption in various forms in the United States, Canada, France, Japan, Italy, the USSR and the United Kingdom. Besides this, the objections themselves, I think, are open to criticism. For instance, there seems to me to be more than one way of activating pupils. They can participate in a lesson perfectly well, both intellectually and emotionally, without necessarily having to express their reactions, however keen these may be, aloud.

These objections, however unfair, do indicate a real danger, but one which can be averted in several ways. A "good" teacher giving a televised lesson can, for instance, punctuate it by putting questions, each followed by a brief pause, so as to stimulate a "silent" response on the part of his audience; he can omit the answers to some of his questions, or he can break off the demonstration at a certain point, leaving the pupils to supply the rest for themselves. Above all, the screen must never be allowed to show an "irrelevant" picture; the pupils must see nothing that is not essential for classification or understanding.

A television teacher must be capable of more than clear exposition, of stimulating the curiosity, reflection and active participation essential for any would-be learner. He must also be able to impart life and colour to the transmission. Here, a number of technical aids are available. It has often been observed that close-ups can create an almost physical contact between speaker and audience and so between teacher and pupils. The teacher on the screen is more than an image and a voice; he can genuinely replace the physical presence of the teacher in the classroom. Everyone may not believe this, but pupils to whom the question has been put are quite definite: "In class the teacher is talking to us all; on television he is talking to me." Another somewhat surprising result of these lessons, revealed by our interviews with the pupils, is that their respect for their teachers is much enhanced by seeing them on the screen.

In fact, as is fully grasped by the teachers consulted during our inquiry, the introduction of televised lessons, even on a closed circuit, restates the whole problem of communication. After all, what is teaching except a product of communication, in the course of which the teacher conveys to his pupils new ideas, new canons of judgment and new ways of doing things? In its passage from the transmitting end (the teacher) to the receiving end (the pupil), the message is curtailed, deformed or altered, so that constant adjustments are necessary. The only check the teacher has on whether his teaching has been understood is through the return message. The checking cannot be put off until special revision lessons, for example, without a risk of the pupils learning to use wrong methods or contracting bad habits. It must be done at once, either by questions put by the teacher to his audience, to enable him to observe their behaviour and reactions, or by making them give a practical demonstration of what they have learnt.

Communication then constitutes a psycho-social phenomenon implying the possibility of two-way communication between teacher and pupils. Hence, we have to consider how best to adapt television to lessons and vice-versa. Our regular practice at Seraing is that part only of the hour consists of a televised lesson, the other part consisting of an ordinary lesson in which the teacher goes over what the class has just seen and gives them exercises on it. This also gives him an opportunity of checking at once how far the instruction has sunk in.

Not every subject is equally suitable for television teaching. We have deliberately restricted it to the courses, or even subjects of specific lessons, which on the face of it appear most suitable, namely, technical and technological ones. In this way, we have been able to enjoy the direct co-operation of the instructors in preparing the lesson and courses.

If television can be given its rightful place in the curriculum, if it is used, that is, as an aid to work and research under the sole control of the teachers themselves, so that televised and ordinary lessons are satisfactorily combined with the teacher retaining his proper status as the person in charge, it should be easy to eliminate the resistance and the objections voiced.

Something else to which I should like to draw attention is our inquiry into the results produced in our own Institute by the use of closed circuit television under the carefully selected conditions I have described. We are particularly anxious that, like all good balance-sheets, this one of ours should be based on figures and on properly calculated statistics and here our method of organisation fits in excellently. Our object is to offer an education that is tailored to individual requirements; with the help of our Psycho-Medico-Social Centre, each year's pupils are divided into homogeneous classes, so that we know exactly the standard of each. As the televised lessons are designed to form part of the ordinary curriculum, it is possible in almost every case to arrange that, for each experimental class following a course of televised lessons, there should be a parallel class of the same standard following the same course of lessons, given by the same teacher, but according to traditional methods only. This can then serve as a control group. The two classes can then be made to sit the same examinations to test their knowledge.

We are not yet in a position, naturally, to give the final results of this inquiry, which must wait till the end of the school year, but we made a beginning on this last stage of our theoretical investigation by examining certain groups of pupils right from the early days of the experiment. The results so far have proved somewhat disappointing. The average marks in both the experimental and the control classes have been very similar, the differences being, in our view, insignificant. So far, however, the advantage may be said to have been on the side of television, as the teachers agreed that it enabled them to complete their course of instruction in a much shorter time. On the other hand, the disparity between the results achieved by individual pupils in the experimental classes, especially the junior ones, was far greater than is usually the case in the corresponding conventional classes.

The pupils in the experimental classes were interviewed separately, in an attempt to account for this anomaly. From the interviews it clearly appeared:

1. that the experiment had not lasted long enough to enable any statistical conclusions to be drawn, and particularly;

2. that the pupils had not been properly prepared beforehand and had been acutely conscious of the unusual, exceptional and purely experimental character of these preliminary lessons.

It appeared from some of their replies, for instance, that, as the presence of a strange audience at each lesson prevented the teacher from asking questions on the subject-matter of previous lessons "for marks", they saw no point in doing homework. It also appeared that some pupils, especially the younger ones, when sitting in front of the television set, could not behave as they normally would in class: "You go to school for lessons but when you look at the telly at home it's usually for fun."

Children have therefore to be prepared for televised lessons in exactly the same way as they have always had to be shown how to use other aids to learning, such as how to read, how to look things up in books, how to use a dictionary etc. The school must introduce the children to television and teach them how to look and observe, just as it teaches them how to read. Another point is that television obliges pupils to contribute more themselves. This I regard as one of its advantages, in view of the complaints one is constantly hearing about pupils today being spoon-fed.

I do not think myself that so very much preparation is required to obtain convincing results.

In the first place, the television camera is so flexible and can be so selective in its choice of images that it ought to be easy for us to adapt our teaching methods to allow more room for observation, research and expression. Secondly, our own observations, our discussions with the pupils, and even the reactions of their parents, have all shown how strong is the interest aroused by televised lessons and how closely they hold the pupils' attention. Of course, some allowance must be made for the attraction of novelty and the fact that the televised lesson itself never lasts more than 20 or 25 minutes.

I am convinced that television, properly integrated with the school, can not only develop useful mental qualities, including the power of observation, and contribute in a new way to training and developing the personality, but, above all, it can revive interest in school and attract the children to education by the same methods as fascinate them out of school. Television in education can no longer be looked on as a luxury. It is a teaching aid which can be of inestimable value, particularly so in technical education where more and more experimental courses are being given.

United Kingdom

CLOSED CIRCUIT TELEVISION IN TECHNICAL COLLEGES IN THE UNITED KINGDOM

Lecture by Mr. H. J. Edwards,
H. M. Inspector,
Department of Education and Science,
London,
and Chairman of the Steering Committee
of the Seminar

I should like to tell you about closed circuit television in technical colleges in the United Kingdom: first, a little about the system of technical education as a background; then, about how closed circuit television is used and for what purposes; finally, about the way closed circuit television may be used in the next five years.

1. TECHNICAL COLLEGES IN THE UNITED KINGDOM

(i) Technical colleges provide further education for students aged 16 and over who have completed a full-time secondary school course.

(ii) The courses provided are very diverse indeed but almost all have a direct link with a trade and industry or a profession.

Some courses lead to university degrees or to membership of professional bodies. There are 190,000 full-time students.

Many young students aged 16-21 attend part-time on one day of the week. There are 616,000 part-time day students.

About 1¾ million students of all ages attend in the evenings only.

(iii) The colleges are of three kinds.

There are 10 colleges of advanced technology which have just been given university status. There are 8 national colleges which are similar in that they provide courses nearly of university standard.

There are 25 regional colleges which concentrate on advanced full-time work.

There are 488 local colleges, practically one in every town, which provide a wide range of full-time and part-time courses.

In addition there are 160 colleges of art and 38 farm institutes.

(iv) Colleges are provided in the main by Local Education Authorities of whom there are 148 in England and Wales. They control day-to-day running and employ the teachers and buy the equipment.

(v) The Department of Education and Science guides the Local Education Authorities with advice and exhortation. The Department is interested in efficient teaching and helps to spread new ideas amongst Local Education Authorities. Educational television is clearly a very powerful medium of communication and the Department is interested in its use both nationally on open broadcast and locally through closed circuit television.

2. COLLEGE USE OF CLOSED CIRCUIT TELEVISION

Some 86 institutions in the United Kingdom are using closed circuit television: 24 Universities, 34 Colleges of Advanced Technology, 19 Colleges of Education (Teacher Training Colleges), and 9 Schools.

In many of these closed circuit television is used as a straightforward instance of its value as a powerful optical aid.

(i) In some art departments there are courses on the design of sets and graphics for televisions. Naturally the department uses a television camera and a monitor to show the students their work on the screen and to judge its effectiveness.

(ii) A television camera can look into a small space and show on the screen magnified details which all can see on the monitor. For example, in electrical engineering it can show the layout of the inside of a television camera. In metallurgy it can help to show the interpretation of the micro-structure of a metal surface. In physics effects which are difficult to observe can be seen by a television camera and shown to everyone e.g. Millikens oil drop experiment; the movement of particles in a cloud chamber.

Experimental physics has been taught to a large class with closed circuit television. After an introduction by the lecturer, selected students perform the experiment and details are relayed by two television cameras to monitors round the lecture room. Each student can make his own readings as accurately as if he were performing the experiment himself and the class as a whole can discuss their results of the experiment.

(iii) A television camera can look at operations which the human eye would not be able to see. It can look e.g. at the cutting edge of a lathe tool or at the point of stress where a metal is about to fracture.

(iv) It can bring into the lecture room pictures of experiments using equipment too big to move e.g. aeroplane engines, lathes n the workshop.

(v) One particular application of this power of unobtrusive observation comes within the sphere of teacher training. Television cameras inside a classroom can show to many students outside a good teacher at work. This is perhaps one of its most obvious applications but one which is outside our brief this week[1]. About 12 colleges of education have now been equipped with television cameras and many more are anxious to use them.

(vi) Many students can watch one teacher. The number of students is no longer limited by the size of the room. One college found difficulty with a course for mining entrants because the industry was being re-organised and the number of students for the course fluctuated from month to month. Sometimes there would be one group of students, sometimes two, sometimes three and sometimes four. The college could not suddenly engage lecturers and discharge them to keep pace with these fluctuations so they installed closed circuit television and linked four rooms together. One teacher proceeds happily with one, two, three or four groups, however many there may be.

(vii) It is a short step from this to direct teaching by television but a very significant one. In a few colleges lecturers have deliberately used closed circuit television as a method of teaching several classes at once. Plymouth College of Technology is one of these and the Head of the Department of Electrical Engineering, Mr. Webster, is here with us and will tell us about the experiments of his College. Lecturers in mathematics, engineering, social studies in particular have used closed circuit television teaching not for the entire course but for important points. For this method to be successful it is necessary to use equipment and techniques which are roughly similar to those used in professional full scale broadcasting, though by no means as elaborate. The basic equipment is a two-camera studio with good lighting; the techniques we need to use are to prepare the lesson very carefully, translating ideas into pictures; to rehearse the lesson under the guidance of a skilled broadcaster so that sound, words and pictures combine to drive home the teaching points; and then to broadcast the lesson in an attractive manner.

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[1] See also Appendix A.

Some people say that to do this well may only be possible with the elaborate resources and long practised skill of the professional television companies. On the other hand we have some colleges in Hertfordshire which are trying with some success to produce good teaching programmes with the simplest of equipment which the ordinary teacher can use. In this way teachers can confidently produce programmes to fit their teaching as and when they wish. Mr. Webster of Plymouth has the same idea; he is trying to show the ordinary college lecturer and the ordinary school teacher how to master this medium of television and how to use it with confidence at any time.

Similar experiments are being made in secondary schools. At Warblington in Hampshire three secondary schools are linked to a television studio in one of the schools. At Kidbrooke School, London, a block of eight classrooms is linked to one classroom which is now a television studio. In both of these school systems teachers prepare their own lessons and broadcast them to several classes at once. In Glasgow all the schools, some 350 in all, are being connected to a central closed circuit television studio.

In the Universities of Leeds and Strathclyde television studios have been installed and television Directors are encouraging departments to use this method of teaching large groups of students.

3. THE REACTION OF STUDENTS

(i) In the lecture room when closed circuit television is used to enable everyone to see detail or demonstration clearly, in comfort, and under the conditions of lighting which enable notes to be taken, then everyone is very pleased.

(ii) In over-flow classes when the camera simply records a lecturer lecturing in another room without any special preparation for television, then this is acceptable for short spells but not as a constant method of teaching.

(iii) Direct teaching in which the lesson is prepared as a broadcast, with emphasis on visual material seems to be acceptable to most students if the quality of the lesson is good; if the broadcast is not too long; if there are teachers or instructors who can introduce the broadcast and follow it with discussion. In these circumstances there is every evidence that students learn as well as they do under ordinary classroom procedures.

4. THE FUTURE OF CLOSED CIRCUIT TELEVISION IN TECHNICAL COLLEGES

(i) There is now plenty of equipment available and it is becoming ever more reliable and efficient. It is not very costly relative to other items of technical college equipment even when equipment for full scale direct teaching is installed. It has a clear advantage in situations which require unobtrusive observation and we can expect that its use in these situations will expand rapidly.

Development will not be held back by lack of equipment or its cost. Indeed if a low priced video tape recorder which is compatible with other video tape recorders can be produced, we may expect a very rapid increase in the colleges wishing to use closed circuit television. This innovation which is clearly not very far away would enable programmes to be prepared and recorded beforehand; or recorded and replayed several times; or it would enable off-air programmes to be used whenever the lecturer so desired.

(ii) The limitations on the use of closed circuit television for direct teaching are not limitation of equipment but they arise from three educational factors:

(*a*) The difficulty of gathering together enough students to justify using a mass medium of this kind. A broadcast lesson takes more preparation than an ordinary lesson and it is only worth doing if more than the ordinary numbers of students benefit. It is not worth using closed circuit television for 30 students; numbers need to be somewhere 100-200 for the effort to be worthwhile. There are not many courses in colleges in which one can assemble at any one time 100 or 200 students who are at the same point in their course and ready for the same lecture. This may only be possible by linking together one or more colleges.

(*b*) There are members of staff who do not find it easy to teach by television. They are not comfortable staring at the lens of the camera. They find the preparation necessary for a good lesson more than they want to do. They cannot teach in their own way; they have to do it according to the way the television producer tells them. They find they have to re-arrange their material and their method of teaching to fit the camera. They are lost without the face to face contact with their students.

On the other hand, these difficulties are taken by some teachers as a challenge to their professional skill. They are fascinated by television. They enjoy making use of its probing eye. They are willing to have their performance criticised and suggestions made.

In fact one of the most evident values of teaching by closed circuit television is that teachers become more self-critical and more willing to accept suggestions from others. It is one of the best methods of in-service training for experienced teachers and one of the best methods of getting new ideas in teaching across to teachers in service.

(*c*) One other limitation on the use of closed circuit television is that we have not yet developed enough skill in using television broadcasts in the classroom. We tend to think very hard about how to put ideas across on television and not enough about how to use them in the classroom situation. Ideally teaching by television should be a team job. The team should be all the teachers of that subject working together. They should discuss what parts of the teaching are to be broadcast and who is to do it; they should discuss what is to be said to the students before the broadcast and the points to be discussed after the broadcast in the classroom. The teacher in the classroom should know what will be coming over the television and should be able to watch it with the students. Team teaching of this kind is possible and is easy with closed circuit television. It is this which is the great innovation, not the equipment and not the actual use of television itself, but the way this medium enables us to approach old teaching problems in a new way. By team teaching on closed circuit televsion the teacher can lose some of his isolation and become one of a group all of whom are willing to pool their ideas and experiences. Television is a fascinating thing in itself but it is only a means of communication; and what really matters is how we communicate with each other and what it is we have to communicate. Our aim is, as it is on this course, to make ourselves masters of this new medium so that we can use it as and when we wish in order to convey ideas to our students more forcefully, more clearly and more quickly.

We in the United Kingdom have something to show for our experimental work with closed circuit television in technical colleges. But we have also much to learn about how to make the best use of the technical resources of television now at our disposal, and we shall be glad to hear from other countries of their experiences.

EXPERIMENTS OF THE PLYMOUTH COLLEGE OF TECHNOLOGY

Lecture by Mr. B. R. Webster,
Head of the College
Electrical Engineering Department

1961 saw the first experiments with a simple radio frequency camera in the Electrical Engineering Department of the Plymouth College of Technology which is a large Regional College serving the South West of England. At first interest was centred on the engineering aspects of television but it was not long before the teaching staff began to recognise that the simple closed loop formed by a television camera and domestic receiver could often be a valuable aid to vision. With the help of this loop, back row students could see better than those in the front, thirty people could simultaneously make a detailed study of the inside of a tiny transistorised radio receiver, a class comfortably seated in a lecture room could study safely the machinery or welding processes in remote workshops.

The following year, again primarily because of engineering interests, two industrial vidicon cameras were bought and these together with the gift of an old image-orthicon camera chain and a variety of microwave link equipment from the B.B.C. enabled a number of technical experiments and developments to be carried out. Later that year a very small studio was brought into use and experiments including microwave transmissions to a College annexe and schools were continued.

Throughout 1963 a large number of experiments were made into the possible uses of closed circuit television in technical education. These covered a range of student levels from first year craftsmen to final year undergraduates. Apart from regular use in the Engineering Departments, successful experiments were also conducted in conjunction with the Biology and Mathematics Departments.

The possibility of using closed circuit television as a new medium of education rather than aid to vision began to emerge and with it the limitations of the existing technical facilities became more apparent. To realise the *full* potential of closed circuit television as a medium for education, we concluded that the following items would be essential:

1. a video recorder;
2. a telecine system backed up by a film making unit;
3. cameras equipped with view-finders and zoom or turret lenses;
4. a supporting graphics unit capable of producing high quality still and animated captions;
5. a complete channel working in colour when required;
6. facilities for electronic mixing, wipes and special effects.

Obviously such a system would be costly and could only be justified if it would assist and could be made available to a large number of students. School staffs were therefore consulted and considerable enthusiasm for using this new medium in schools at all levels from infants to the sixth forms of secondary schools was found. Plans were therefore drawn up to provide a television service for all the schools in the City of Plymouth and the surrounding areas.

Meanwhile, experiments continued and early in 1964 the first outside "broadcast" was provided for a Council of Europe Course on Sailing. This enabled racing rules and tactics to be explained with the aid of models, diagrams and charts while comparisons were made with the picture from another camera watching actual situations arising in races taking place in Plymouth Sound.

At the end of 1964 the first small studio became hopelessly overcrowded and a move was made into two large rooms which were fitted as studio and technical area respectively. Using these facilities many teachers have already been trained in the techniques of teaching by television and this work is continuing.

A new television centre, designed to provide all the facilities previously described is now nearing completion. It will consist of a small presentation studio with overhead lighting grid, full acoustic treatment and air conditioning. Separate areas are allocated for vision, sound, lighting and production controls, telecine and the video recorder. The new College assembly hall and stage are being made dual purpose areas and will, when required, be able to serve as large area studios. A master control and switching desk will allow the various signals to be directed to the appropriate channel for circulation over cable links to more than 100 schools and many lecture theatres and classrooms within the College.

At the present time some 40 schools are connected to the circuit and trial lesson programmes recorded on the College's broadcast quality video recorder are being used to test out the facilities.

CONCLUSIONS

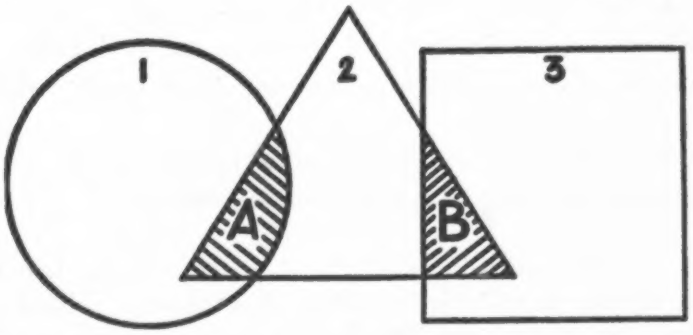
After a wide range of separate experiments in many fields of study spread over an academic range from first year infants to final year degree students, and reference to an extensive collection of material from the U.S.A. and elsewhere, we have concluded that closed circuit educational television can be separated into three categories, each with distinct characteristics and applications viz:

Group 1. A simple portable closed loop forming an electronic magnifying periscope or telescope (Symbol ○).

Group 2. A more complex closed circuit television system with two or three cameras and a sound system (Symbol △).

Group 3. A complete educational television unit providing broadcast quality programmes to a number of receiving points (Symbol □).

The relationship between these three groups is shown by the simple diagram below.



The universal danger symbol for Group 2 is appropriate since there is a constant danger of this type of system being (*a*) too complex and cumbersome for regular and easy use as a visual aid, and (*b*) too elementary and lacking some of the essentials of a true educational medium. This is not to say that there are no uses for Group 2 systems. For teacher training and for many forms of programmed instruction and training they are ideal. The shaded areas A and B are of particular interest as they represent the overlap of the systems. For example Group 2 systems can profit from (A) the many techniques developed to increase the usefulness of the television loop as a visual aid, and from (B) by the use of a simple electronic device for split-screen operation or the use of simple devices for animated diagrams.

We believe that there should be immediate encouragement for a very widespread use of Group 1 systems and a rational programme of Group 2 and Group 3 system developments should follow a careful analysis of the requirements in individual colleges, schools or districts.

CURRENT PROBLEMS IN FRANCE

Lecture by Mr. E. Brunswic,
Head of the Closed Circuit Systems
and Experimental Establishments Section,
School Radio and Television Department,
Institut Pédagogique National,
Paris

I should like to begin by thanking the organisers of this seminar for the opportunity it provides of describing the latest French experiments in closed circuit television, especially for technical instruction. I say "the latest experiments" because OECD has already issued a short history of the subject by Mr. Girard, which deals with the use of the medium in scientific and technical education in France. As that covers the situation up to 1963, I will refer you to it, if I may, and concentrate on what has been achieved since then.

Mr. Girard's report describes the operation of the closed circuit system at the Lycée Dorian in Paris which is where the three recorded telecasts you have seen were made. The workshop-classroom transmission is now a well-tried, almost classic technique which is used in several technical colleges. It is no longer, however, a matter of first concern.

The place of closed circuit television in the French educational system

If you are to grasp the problems concerned and the way they are developing properly, I should begin by saying a few words on the place of closed circuit television in the French educational system, as seen from the administrative point of view.

First of all, unlike other countries, France draws a very sharp distinction, even inside technical institutions, between secondary education and higher education at university level. In higher education, which is less centralised and where there is far more freedom, closed circuit television is already in fairly wide use. At the moment between 60 and 70 black and white closed circuit installations are being used in the Faculties, and even 2 in colour, in the teaching of medecine, the Medical Faculties being naturally enough the best equipped.

Closed circuit television in higher education has two uses. In group 1, to adopt Mr. Webster's terminology[1] it can be used to transmit information from a lecture hall to another room in the same or an adjacent building ; from there, we pass direct to Mr. Webster's group 3 which involves establishing microwave links between universities to enable lecturers to address each other's students. For example, a regional transmitter at Nancy could be used to link the universities of Strasbourg, Nancy, Lille, Dijon etc. This type of closed circuit television link between different educational establishments is at present only used in higher education.

In secondary, as well as in technical education, a different use is made of closed circuit television which we may say has, in a sense, developed into two sectors since 1963: a free sector largely concerned with technical education, and an experimental sector.

There has been a considerable increase over the past two years in the number of closed circuit installations in technical colleges. I will not enumerate them, as a descriptive list has been circulated of which you will already have received copies [1]. It can be said, however, that the educational problems peculiar to closed circuit television, especially certain theoretical or methodological aspects, cannot be solved at the level of technical instruction, which has its own immediate needs and different preoccupations.

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[1] See preceding lecture.

Accordingly, while encouraging the equipment of technical colleges, the authorities do not intend to carry out any systematic experimental research in this sector, with one exception: the experiment to be carried out at the Higher Technical Teacher Training College at Cachan where an extremely complex system is to be installed, comprising three television chains, one for classroom-workshop transmissions with extension to the studio, the second to link up with laboratories in higher education establishments, and the third for observing the classes working with television and for training the teachers.

Since 1964, our aim has been to improve quality, not quantity. The principle of using television as a visual aid to education is now recognised, but the question of how to move on to a more advanced level is only beginning to be considered. Mr. Dieuzeide, I believe, has described it somewhere as the move from the minimum to the maximum use of television.

A special service

A special service has now been made responsible for conducting experiments into the use of closed circuit television systems and promoting their installation on a nation-wide basis. And here, I should like to make clear the position of our institution. The *Institut Pédagogique National* is the branch of the French Education Ministry responsible for research into and furtherance of educational methods. It has several departments, including a Teaching Aids Department which produces films, slides and records and a School Radio and Television Department which, as its name implies, produces broadcasts for schools and whose head is Mr. Henri Dieuzeide.

I should like to stress that the School Radio and Television Department (RTS) of the *Institut Pédagogique National* does not form part of the ORTF (the French broadcasting corporation). It has its own studios which are nothing to do with those of ORTF from which it merely rents broadcasting facilities, and is responsible for the production of all school broadcasts. Within the past twelve months the RTS has set up a subsidiary section — my own — to deal with closed circuit systems. Thus, there has from the first been an organic link between open and closed circuit television.

Thus we are perhaps better placed than some other countries to reflect on methodology and to raise various problems connected with closed circuit television. In the first place, our centralised organisation of education enables us to carry out nation-wide experiments, using appropriate means; secondly, when developing closed circuit systems we have the advantage of the experience gained over ten years by a school radio and television service which is still producing daily programmes and is always ready to advise us or lend us its own technicians to help our research.

This new section has not, however, been in existence long enough for me to present you with any detailed conclusions. I can only tell you what problems we are meeting with, and how we are trying to deal with them.

Some of these problems are urgent while others are less so, and we obviously have to take a long-term view which, in educational matters, means looking about ten or twelve years ahead.

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2. See at the end of this lecture.

Urgent problems

I will begin with the urgent problems. The first is the resistance to closed circuit television we initially encountered on the part of the teaching profession. This had several reasons which we have tried to sort out. Mr. Ista, with whose views on the subject I entirely agree, has already spoken to you of the apprehension that this new technical device has aroused in some teachers. However, the old chestnut about television replacing the teacher has now been disposed of once and for all. There have been a few unfortunate experiments which have shown clearly enough that television does not replace the teacher, that it cannot do so, and that the question is not of closed circuit television as a substitute, but how best to use it and make it an integral part of the school arrangements. I would regard any attempt in present conditions to replace teachers by television, or even to use it to reduce their numbers, as completely unreal.

The true reasons for the resistance to a wider use of closed circuit television must be sought elsewhere. One is certainly the unwieldy equipment and the inevitable hard work involved in using a closed circuit television studio. A studio of the "Sèvres" type containing remote controlled equipment is a clumsy instrument leaving no freedom of action to the person making use of it. In theory, the teacher remains in charge of the lesson; but he has to rely for the transmission on the producer who from his control desk directs, alters, reshapes. The script is too rigid to make any improvisation or modification during the actual transmission possible.

We have sought to deal with this problem by considering adjustments to the equipment and trying to persuade the manufacturers to work out designs better adapted to educational needs. We wanted to design a closed circuit television studio on different lines from the type used for ordinary programmes, which would allow the teacher giving the lesson to address his audience directly without having to spend too much time in preparation, and also to retain full control over the pictures shown as well as the subject-matter.

Another problem we have had to consider is how to adapt electronic equipment to teaching requirements. First, there is the camera itself. At present we are using industrial type vidicon compact cameras which are not really suitable: they are not synchronised, and cannot be used for recording superimposure and other electronic effects. Professional-type cameras would of course fulfil these technical requirements but they call for skilled operators, while the pictures themselves are of a quality in excess of the needs and financial resources of a closed circuit system not intended to serve more than one school. We are still looking for a satisfactory answer.

A further difficulty is that industrial-type vidicon cameras are extremely sensitive to reflections of shiny objects and this is particularly inconvenient in the case of workshop-classroom transmissions. For example, fear lest a reflection should mark the vidicontube image, sometimes protracts or holds up the preparation of the shooting which often has to be broken off to allow the spraying of a dulling solution. That is the kind of snag that complicates the ordinary everyday use of a closed circuit. There are various ways of getting round it. One way would be to use an iris controlled by a photo-electric cell; this would also save the teacher from having continually to adjust the contrast range but would not fully protect the tubes. Another way would be to desensitise the photocathode.

Another thing we did was to have an "overhead-camera" device constructed (*table d'analyse électronique*). I think the plans for the prototype have already been passed round. The main idea was that one of the cameras in the studio should be under the direct control of the teacher so that he could choose himself the area of any exhibit he wished to show and apply a genuine audio-visual teaching method. The problem here is no longer electronic, but mechanical. The camera must be mounted on an arm like that of a dentist's drill, so that it can either remain vertical or take pictures from an oblique angle, this being particularly useful for photographing three-dimensional machinery, or models of various kinds. Lastly, the camera must be highly mobile to enable it to follow, say, an itinerary on a road map — the route from Paris to Liège, for instance.

We are also researching into means of using closed circuit television to expand audio-visual teaching further by facilitating the exploration of an exhibit area by area — an operation almost impossible to carry out by the traditional methods, for instance, exploring a slide section by section, since the projection is indivisible and possibilities of operating on the slide are limited. Our idea was that, by rear projection on to a rear view mirror, the picture from the slide could be thrown horizontally on a glass frame under the "overhead camera", which the teacher is working. In this way, by adjusting the zoom lens and with the camera held, as I have said, vertically above the exhibit, or by panning the camera, it should be possible to isolate a section of the picture, to produce travelling shots and to superimpose diagrams or captions directly.

Equipment of this type enhances the use of closed circuits and makes one long to try out these direct methods in the studio for oneself.

Lastly, we are working on a combined arrangement of telecine and slide "reader" for remote controlled projection so that all kinds of filmic material could be introduced during a demonstration, thus making possible a sort of "montage".

For us, the key to the use of closed circuit television lies in a combination of the various audio-visual methods.

What we are really thinking in terms of, therefore, is a kind of laboratory of teaching methods, each establishment possessing every appropriate facility and resource. In practice, there would be a number of cameras in the studio. Two would be used by the assistant or technical director, one for scanning the exhibits already prepared on a desk, on a flannelgraph or magnetic board, the second would provide an intermediate shot, while a third picture, conveying the essence of the instruction to be given, would be provided by the "overhead camera" and prepared by the teacher himself.

An arrangement of this kind would leave the teacher in full control, able to alter the picture in the course of the transmission if he felt inclined. This flexibility seems to me a basic argument for converting members of the teaching profession to the new method and convincing them that it will neither frustrate them nor hamper their freedom of action.

But there is more to the art of teaching than technical equipment. So far, we have only been speaking of the vehicle whereby a certain type of communication is rendered possible. We have also learnt, however, that if the best use is to be made of a closed circuit the teacher will need to have at his disposal the widest possible choice of exhibits, photographs, slides, short films and animated cartoons. Here we come up against the practical problem of how to catalogue the resources of this kind available in each country. Perhaps we can look forward in future to the exchange and free circulation of educational material being organised on an international basis. If, for the recorded telecasts we offered you yesterday, we had had some short documentaries showing shrinkage actually taking place in welding at a coach-builder's for example, I am sure that the lesson would have been both shorter and more valuable. Yet we do not want the main preparation for a closed circuit television lesson to become a mere hunt for exhibits, or the production of supporting material. On the contrary, we want to simplify the use of the closed circuit system and reduce the time needed to prepare a transmission as much as possible.

Another use that could be made of the closed circuit system would be for re-transmitting programmes broadcast over the air. One advantage of this would be to give greater flexibility in the use of national school programmes, if only from the point of view of timing. Still more important, it would enable the teacher to interpolate his own comments. Moreover, every programme does not suit all requirements, some cannot be used in full, others need to be broken up by interspersing a slide, or a drawing, or even an explanation at the chalkboard, if the speed at which the programmed lesson is given is too fast for any given class to follow.

All this is possible with closed circuit television, which offers a whole range of possibilities for providing regular instruction, without the need to restrict oneself to the broadcasts offered on certain popular subjects.

So much for some of our immediate problems.

Medium-term objectives

In addition to these, however, we have various medium-term objectives also connected with the combined use of closed and open circuit television, but considered from another angle.

In the first place, closed circuit television offers and will continue to offer a means of trying out programmes later to be broadcast on the national network. The closed circuit installation belonging to the Sèvres Lycée was used, for example, to finalise the methods of our various "telemaths" courses. Closed circuit systems should enable new types of experimental programmes to be tried out on small audiences, or even advance showings to be given of certain programmes. Independently of the actual content, research will concentrate on the structure of the audio-visual message: for instance, on the right relation between information content and motivation. This research will not, of course, have any direct effect on current broadcast production, which cannot easily be modified, but it will be of value for new programmes to be produced in three or four years time.

And so today I found the Seraing experiments extremely interesting, with their careful inquiry into the best method of obtaining a perfect balance between the visual and verbal content of the message and the utilisation intended. In the programme shown us this morning there was not a single superfluous picture. Restraint of this kind, which is comparatively new in television, is in line with the research being carried out in the School Radio and Television Department into the introduction of programmed instruction in the broadcasts and their utilisation with the help of programmed booklets. This research will take a long time to complete and such programmes cannot be improvised, but the example of our Belgian friends shows that we are on the right track and that there are several lines of study which may converge.

One problem is that of finding producers. Open circuit television eats up producers at a great rate, all of whom must be specialists. But the mere fact that he knows his own subject does not make a teacher into an audio-visual specialist capable of producing a television programme. He has to learn to translate his thoughts in visual language and analyse the subject-matter he intends to present. Use of closed circuit television would give new teachers an opportunity of acquiring this indispensable training. That is another and not the least important point of contact between closed and open circuit television, and it is possible because the two services are related and both come under the same department.

Other medium-term educational problems concern the proper use of closed circuit television and these are problems connected with the present plans for school reform and the need to improve the efficacy of the hours given to instruction.

There has never been any difficulty in teaching most subjects without the use of television. What we are wondering now is whether, with the help of specific, adaptable audio-visual methods, it may not prove possible to educate children who do not respond to the usual type of oral teaching. Could the systematic use of closed circuit television increase the percentage of scholastic successes, reduce the disparity between individuals and produce more homogeneous classes? We are investigating these possibilities but it is too early yet to talk of results. It is, however, a very important question, at a time when there is so much talk of raising the school-leaving age and vocational guidance.

Long-term problems

From the long-term aspect, we are considering how to make the widest possible use of television, though that does not mean we want to use it to replace the teacher. On the contrary, we have gone carefully into the process of instruction, and the relationship between teacher and pupils would appear to pass through three stages. By distinguishing between these, it becomes possible to make the fullest use of the powers of the individual teacher.

The first stage is obvious: the teacher addresses a large class but there is no two-way communication. The pupils register but do not react immediately. It may be called the collective instruction stage during which mass media can be used, the relation being one-sided.

The second stage is usually devoted to utilisation and discussion, and involves two-way communication. The pupils have to reproduce what they have learnt, either verbally or in writing. This is difficult in today's classes of anything from 35 up to 50 pupils, and could be done much more efficiently in sets of about a dozen; but how can enough teachers be found unless they are released during the stage where their personal presence is not essential, that is when facts are being purveyed.

The third stage is that in which the pupil works by himself, though possibly with the help of exercise sheets such as we were shown this morning[1], which enables him to correct his own mistakes and see where he has gone wrong. He can thus progress on his own.

We are at present investigating various ways of re-organising the educational system on the basis of the principles I have been describing and with the help of closed circuit television. The whole question is an extremely complicated one since it challenges all our previous ideas on education. Some study has been given to it in the USA, and I would refer you to a collective paper edited by Judson T. Shaplin under the title of "Team Teaching", which has been published by Harper and Row.

From the practical point of view, our present school buildings also give rise to prolems. They are by no means always suitable for closed circuit television as they were built for classes of from 30 to 40 pupils and offer few facilities for moving pupils from one room to another. The classrooms are not soundproof and reception is often difficult. The acoustics here, in the Seraing Institute, are extremely good; the walls are thick and the room itself is the right shape. But in the average classroom, which is often made of reinforced concrete, it is extremely difficult to make use of audio-visual aids owing to the reverberation. However, to change the whole concept of school building is again a long-term project.

So much for a brief summary of our main preoccupations in this field.

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[1] This refers to more elaborate exercise sheets than the one appended to the report on "Methodology" prepared by the Seraing Institute.

Some proposals for concerted action

Before I conclude, there are certain suggestions I should like to address to the Council of Europe.

First, can we not have more television equipment specially designed for educational purposes? As the needs of each country are small, industry is utterly indifferent; but if several countries were to join in ordering specific types of teaching equipment the matter would be taken more seriously by the manufacturers, especially some of the big international companies, and more of their designers would be set to ponder problems relating to education.

Secondly, can something be done to facilitate the circulation and exchange of films for transmission over closed circuit installations?

Thirdly, the exchange of information is still a serious problem. News of experiments often take up to two years to get round, so that development is constantly being held up. It seems to us essential that arrangements should be made for exchanging such information between the Council of Europe countries.

Lastly, I would express the hope that this seminar may prove the beginning of real combined research by the member countries into the use of closed circuit television as a means of promoting education.

SECONDARY EDUCATION

State technical colleges equipped with fixed closed circuit television

SCHOOL	EQUIPMENT	UTILISATION
LIEVIN Lycée d'Etat	5 compact cameras Central studio Tele-cine and tele-slide projector "Overhead camera" (table d'analyse) 7 classrooms each equipped with two receivers Independent classroom-workshop link equipment.	1st circuit of the experimental plan of the Closed Circuit Section. General instruction Technical instruction (technology, mechanics, heat).
DORIAN Lycée technique d'Etat de garçons	7 cameras 6 classrooms each equipped with a receiver.	Picture transmission: technology Practical workshop operations.
RENNES Lycée technique d'Etat de garçons	1 camera 2 classrooms each equipped with a receiver.	Picture transmission: technology and electrical engineering.
TOULOUSE Lycée technique d'Etat	1 camera 1 receiving set.	Episcopic projection; picture transmission: technology.
LYON Lycée technique municipal	1 camera 1 classroom equipped with a receiver 1 workshop.	Picture transmission: technology.
LILLE Lycée Baggio	2 cameras 1 lecture room, 6 receiving sets.	General technology Picture transmission.
LONGWY	1 camera 3 classrooms each with a receiving set.	Picture transmission: technology.
MARSEILLE	1 camera, 2 classrooms each with a receiving set.	Picture transmission: technology and science.

EXPERIMENTS
OF THE DORIAN TECHNICAL LYCEE

Paper prepared by Mr. P. Boucheret,
Principal of the Lycée,
and presented by Mr. D. Siciliano,
Electronics Master at the Lycée[1]

I. THE DORIAN TECHNICAL LYCEE AND THE CLOSED CIRCUIT TELEVISION EXPERIMENT

The Dorian Technical Lycée is a college of upper secondary level. Like many similar institutions, it comprises two sections, in which the pupils work respectively for:

(*a*) The *Baccalauréat* (GCE) in mathematics and technical subjects, leading to higher education.

(*b*) The Technical and Higher Technical Certificates.

Training is given in two main branches:

(*a*) General mechanics: (i) practical (ii) theoretical.

(*b*) Electronics: (i) industrial electronics or (ii) tele-communications.

The Dorian Technical Lycée is an old-established school (a new building is planned) short of premises but well provided with equipment of various kinds.

The present trend in France, particularly in technical education, is causing it to assign greater importance to experimentation, educational research, school guidance and vocational guidance of pupils and to seek to increase its efficiency in part by the systematic use of audio-visual aids. The circumstances were thus psychologically and materially such as to induce a group of teachers in 1961 to begin the experiments which you are to see.

II. PREPARATIONS FOR THE SERAING SEMINAR

1. *Subjects of lessons*

These were in part prescribed. Had we been quite free to choose, we might have shown lessons more closely related to our curricula and our technicians' courses.

e.g. General study of tool-holders.

Study of guidings.

The subjects suggested to us appear to have been selected for training differing from ours. Is not a lower secondary technical school substantially on the same level as our technical education colleges for training skilled workmen?

We finally selected three lessons for our student technicians during the second of their three years of training, i.e. in Industrial Mechanics, Class I.

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[1] Mr. Siciliano has supplemented this paper by information on the technical characteristics of the Lycée's closed circuit television installation.

Shrinkage in welding: a lesson dealing with complex phenomena that are difficult to display, calling for largescale experimentation and equipment which cannot be set up in a classroom, involving a particularly noisy workshop: television was the obvious answer.

The lathe spindle: direct observation impossible, transport difficult, need to show it in motion and to be able to project alternate start-up and stopping at will.

Milling-machine graduator: equipment accessible for observation but heavy, difficult to transport and has to remain fixed to the bed of the milling-machine.

In the two latter cases television was again the answer.

2. *Content of lessons*

These are lessons in general technology intended for the whole class (30 to 35 pupils). They take place away from the workshop in a classroom equipped with a television receiver and an intercom with the workshop.

Television thus contributes immediacy, a constant two-way link with the workshop, and possibilities of intervention, interchange and repetition as needed.

These lessons — very different from those transmitted on open circuit — require additional experimentation on simplified measuring devices, where needed, and hence special advance preparation.

They presuppose the indispensable general knowledge (of mathematics, science, technology) in keeping with our syllabuses.

The lesson "Shrinkage in welding" being very long, only part of it was covered.

A check list of questions was handed to the pupils at the end of each lesson and answers were subsequently corrected by the teacher.

3. *Preparation of lessons for presentation at Seraing*

Other audio-visual media are drawn on: stills already made by the teacher as regards the graduator, slides issued by the *Institut Pédagogique National* as regards the welding. The blackboard is always in frequent use.

Since we could not produce the lesson "live" at Seraing itself before a class of pupils, we decided to film it and hope this will give a fairly good idea of our methods.

The film only includes the most typical sequences, linked by short passages of commentary and showing in turn the various phases of the lesson in the classroom and in the workshop.

The shooting called for considerable help with equipment from the Institut Pédagogique National (kinescope recorder, video recorder) which substantially altered the classroom atmosphere. We deliberately refrained from presenting the potentialities of television in the actual workshop at the permanent disposal of each teacher. A few photographs are available for examination:

(*a*) Guided exercises.

(*b*) Pointing-up of details not clearly distinguishable to the naked eye (angle of intersection, welding baths).

(*c*) Examination of metallurgical shots.

(*d*) Stroboscopic effects.

III. SUPPLEMENTARY INFORMATION ON THE PREPARATION AND PRODUCTION OF LESSONS IN WHICH CLOSED CIRCUIT TELEVISION IS USED AT THE DORIAN TECHNICAL LYCEE

For the moment, the current experiment at the Dorian Technical Lycée has been undertaken only by teachers of technology and workshop practice. This limitation, however, is only temporary. Each teacher is free to decide which lessons in his syllabus can usefully be enhanced by closed circuit television.

The Dorian Technical Lycée has no studio and no special room for shooting or control. However, it is hoped in the near future to arrange part of the general technology and building laboratories for the purpose. This will eliminate one of the obstacles to more extensive use of closed circuit television since it will be possible for every teacher to call more or less at any time on the laboratory staff for the operation of the necessary equipment.

In any case, and irrespective of the material facilities provided, the whole responsibility for preparing the lesson remains with the teacher, namely:

(*a*) Decision as to educational content and general documentary research.

(*b*) Design, ordering and testing of additional experimental material.

(*c*) Selection of portions of lessons for which employment of television is indispensable.

(*d*) Determining the relevant equipment required: spotlights, cameras etc.

(*e*) Preparation of the "script" with such details as: distance, lighting etc.

Thus a great deal of time is needed for preparation, certainly several hours; hence the absolute necessity for setting up a central preparation department at the disposal of every teacher at any moment.

The lesson usually takes place in a classroom not specially equipped apart from the receiver and the intercom (six rooms equipped). In the classroom the teacher remains in control of the lesson. In the workshop he is assisted — for the time being — by a colleague or, more often, by one or two pupils who have received the essential preliminary instruction and are capable of taking the shots (prepared beforehand) and transmitting them.

IV. PROVISIONAL CONCLUSIONS

Closed circuit television simultaneously affords:

(*a*) Ease of observation: enlargement: safety: (heat treatments).

(*b*) Originality and variety in observation.

(*c*) Immediacy: the event is experienced as it occurs.

(*d*) Presence and motion.

(*e*) Adjustment to the pace of the lesson and the level of the class.

(*f*) Immediate reaction to technical and teaching incidents.

Closed circuit television has its limitations:

Like all audio-visual media, it is only an adjunct and should remain so.

It does not render direct contact (wherever possible) with tools and material superfluous, but does facilitate it.

Its use demands lengthy and careful adjustments.

It does not — at least for the moment — reproduce colour.

May I say here that I hope it will soon be possible for specialised industry to make available to us equipment suitably adapted to our particular educational needs:

(*a*) easy to handle,

(*b*) simple to use,

(*c*) with high optical performance (demanding little in the way of lighting, insensitive to reflection),

(*d*) well designed accessories.

The use of close circuit television thus calls for competence, intelligence and conscientiousness — but surely these are the qualities to be found in every teacher, sole master in his classroom.

THE USE
OF CLOSED CIRCUIT TELEVISION
AT THE SÖDERTÄLJE VOCATIONAL SCHOOL

Lecture by Mr. K. Gustavsson,
Technical Teacher at the School

During the last few years, great changes have taken place in Swedish education. A nine-year elementary education is being developed and the timetables and aims of higher education have to a large extent been revised and teacher training intensified. The time allotted to courses and curricula has been increased to a very large extent, particularly after radical changes making possible a better adaptation to the expanding educational needs of community and industry. It became apparent during this planning that teaching material needed to be modernised and increased.

While these plans were being carried out, the Swedish Board of Education recommended the installation of audio-visual material, following proposals from the Central Organisation for Teaching Materials and experience in the field. Within vocational training the problems have often been great because technical progress has been so rapid that it has been difficult to cover the theoretical and practical curriculum to the required level. In different parts of the country new audio-visual material has therefore been tried out and, in this connection, even closed circuit television. At the Vocational School in Södertälje, the first experiments were carried out in 1957. The equipment to begin with consisted of a television camera and a monitor, but was increased as the experiments progressed. The results were continually reported to the Board of Education. Very good results were obtained from the experiments and the aim was to procure equipment which, without being too costly, could be used not only for closed circuit television programmes in the classroom, as will be shown later, but also as a complement to other audio-visual material.

Choice of camera

The experiments showed that the camera's rate of scan should be not less than 400 lines. It can certainly be more, for example 500 - 600 lines. It should also have an automatic focussing device for contrast and electrical focussing to make its use easier for teachers who are not technically trained. It was also shown in practice that the camera (or its control unit) should be provided with both video and HF outlets. The video outlet for the feeding of the monitor gives quite naturally better picture quality, while the HF outlet through sideband suppression gives a somewhat poorer one. The HF outlets have, however, the advantage that ordinary television receivers can be used both in the classroom and in other parts of the building. Transmission can then be arranged over the central antenna installation to other classrooms.

Choice of lens

The normal lens with which the chosen camera is delivered in Sweden is a 16 mm cine-lens with a focal length of 25 mm. As the possibilities of this lens are limited, a middle ring fixture was tried for the film-camera of Paillard-make, which gave an increase in distance to 70 mm with 5 mm steps. This system was, however, somewhat unpractical, and a bellows fitment to increase the distance from 0 - 100 mm was accordingly designed and constructed by the school's mechanical department. This addition turned out to be especially valuable for close-up pictures and for use with a special stand which will be shown later. For general use a zoom-lens with a focal length varying from 17 - 68 mm was very useful. Through a suitable combination of standard lens, middle ring fixtures for continual variable sections, and continuous zoom-lens, most of the different problems of reproduction could be solved.

Choice of camera stand

The usual tripods for film cameras could with advantage be used for lighter cameras. Heavier cameras with built-in electrical tracers demand, however, a camera dolly or a stronger tripod especially constructed for this use. For the reproduction of details from books, magazines, drawings or other objects which need larger or smaller enlargements, this type of stand is somewhat unpractical. A survey of the market showed that Ernst Leitz in Wetzlar, Federal Republic of Germany, manufactured a reprocamera, Reprovit II a, which could be used for making film strips and photographs for teaching and the support of which had sufficient mechanical stability even for large reproductions. As the support was originally not meant for a television camera it has been provided with a specially manufactured simple fixture making the fitting of the television camera easier. This fixture was made at the school. Contact has also been made with the Leitz factory regarding the mass production of this fixture as standard for the support.

Methods of securing the object to be shown

So that details from handbooks, wiring diagrams, schematics and so on can more easily be reproduced, it is of advantage to make use of some form of permanent fixture. An excellent one is also delivered as an extra fixture to the above mentioned repro support. This object-podium makes it easy to hold down books under a glass plate as well as drawings, while providing adequate space for comments. It is further possible to make other additions and remarks on the glass plate of the podium with wax chalk. The television camera can also be used for the showing of slides or even just selected details from one slide, by the help of a dialighting system. Such a system is also to be found as an extra fixture to the repro support.

Choice of the video-receiver

As already mentioned, there are two main alternatives for the transmission of pictures from the television camera. One can make use of the HF channel of the camera and reproduce over an ordinary standard television receiver, or make use of the video outlet of the camera and reproduce with the help of a special receiver (a monitor, a video-receiver) which do not have HF and sound circuits. The quality of the picture is of course better on the video-receiver, but the HF receiver is more advantageous because it can be used for transmitting via the central antenna system in the school building and, at the same time, for receiving regular school television programmes (open circuit). The ideal would presumably be a combination of both these receivers, a receiver which could thus be reconnected from the video to the HF. Experiments have also been made with projection-receivers, which should make it possible to show television pictures either from the closed circuit camera or from the air (open circuit), with an area of 1.20 × 1.60 metres on the projection screen. The results showed that the strength of light on the apparatus even when it was completely dark in the classroom was nevertheless relatively weak. Because the light intensity apparatus involved a considerably higher cost, the experiments were stopped until more intense light and also cheaper apparatus were available. Reduction of the size of the picture in the television projector to somewhat smaller dimensions increased the strength of the light, but not to the extent desired.

General conclusion from experimental activity

During the experiments, it became quite clear that closed circuit television was a new medium with great possibilities. Teaching results could be greatly increased, the interest of the pupils stimulated and time saved. At present, close co-operation is going on between psychologists and teachers in order to work out statistically the percentage increase in the knowledge intake of the pupils. It is too early to give definite figures, but the preliminary test results have shown an increase of between 25 and 30 per cent. It has also been noted that the results are to a large extent dependent on how a television lesson is prepared and how the teacher makes use of the possibilities of the television equipment. It has been shown by experience that it is necessary to brief the teachers so that all the technical possibilities can be clearly explained. Information activity should also be supplemented by practical demonstrations so that the frequently ungrounded fear of the technically complicated material can be dissipated. With the simplicity of use which is typical of the latest television equipment dangers have been largely overcome. In the following, some examples of the use of the equipment will be given.

Example from a lesson in radar technique

A split-up view of a radar station is made up of a large number of details. With the help of a television camera the teacher can easily show the detail of the parts being discussed during the lesson. The interest of the pupils is concentrated on this detail, which is greatly enlarged, and distracting side details fall outside the field of the picture. The camera can also be pointed alternately towards the practical details in the apparatus and towards the wiring diagram on the table. By keeping the light on in the classroom, the teacher can make illustrations with chalk on the blackboard. While the pupils are studying materials, the teacher can use the television camera to give instructions as to where the details in question are to be found in the apparatus. At the same time, the pupils can find the details in the instruction book.

Examples from practical work in tele-technique

The pupils receive instructions via the television camera as to how the laboratory unit is to be connected and how measurements are to be carried out. The teacher makes comments with the help of the camera on the wave forms of the oscilloscope.

Example from a lesson in tele-technique

With the help of the television camera the teacher can show a wiring diagram of the actual unit which is being dealt with at the same time as a slide projector shows a picture of the mechanical structure on the projection screen.

Plans for extension

Plans are now being made to establish school television centres within the larger school districts in the country. It is intended that each district will then receive a common television centre for several types of school forms within the district. The equipment will be made up of studio equipment for direct transmission as well as a videotape recorder for the recording of open circuit school television programmes. The programmes will later be sent out to schools which, because of their time-table, need the lessons independently of the transmitting times of the school television. It will be possible to make use of experts from all quarters and recording can take place at any time. Furthermore, the possibilities of transmitting, via a HF channel within television band 4, to the actual schools in the area will be investigated. It would then be possible, without any expensive coaxial cable connections, to make use of the existing central antenna system and the standard receivers. Offers have also been received from a Swedish commercial broadcasting company for eventual recordings of school television programmes on video tape.

Summary

The experiment with closed circuit television in education has in Sweden given very positive results. As a complement to other audio-visual material, television equipment has great advantages. The effectiveness of teaching is increased, the interest among the pupils is stimulated and the time gained during a lesson is considerable. The work of lesson preparation should, however, be increased, as well as the adaptability of the teacher to the new medium, in order to reach the final result. The costs of the equipment can be kept within reasonable bounds in relation to their possibilities as long as the material is chosen carefully. The Swedish experiments will therefore continue.

COMMUNICATIONS

Oral statements
by delegates of States
which did not present main reports

Note

As closed circuit television is not used in technical education in all the countries represented, some of these communications are concerned with the use of closed circuit educational television in general or with open circuit educational television (or with planning in these fields), or consist of general observations on these applications of television.

By showing how the use of closed and open circuit educational television has already developed and may further develop in European countries, they made a definite, if indirect, contribution to the seminar, since the use of closed circuit television in technical education is directly connected with its use in other branches of education and is to some extent dependent — in both practical and psychological terms — on the degree to which open circuit television is used for educational purposes.

THE USE OF TELEVISION IN AUSTRIAN SCHOOLS

**Communication by Mr. W. Brandstetter,
Teacher and Head of Department
at the Technologisches Gewerbemuseum,
Vienna**

Austrian schools have already been using new audio-visual media for some decades. As in other countries, they were introduced through the initiative of forward-looking teachers. Beginning with the projection of photographs and slides, they gradually came to include silent and sound films, gramophone records and magnetic tape, radio, and television. The main difficulty was the lack of adequate presentation equipment and accessory technical installations.

Under the Austrian Education Acts of 1962 and their implementing regulations, the educational system was reorganised in accordance with modern ideas, from the first to the thirteenth school year, in general and vocational schools, lower and upper secondary schools, and instructors' and teachers' training colleges (excluding colleges of agriculture and forestry). The same applies to teaching by audio-visual methods.

Television has been used for about ten years in certain branches of higher education in Austria, for instance, at the first surgical clinic of the University of Vienna and the faculty of physics at the Vienna Technical University, to enable a large number of students to follow the surgical operations or experiments, sometimes connecting up a second lecture room by closed circuit television.

Following the satisfactory results of the school radio broadcasts, the first experiments in educational television began in Austria on 23rd September 1959 in primary and in lower and upper secondary schools. The producers of school television have since gained much experience, which they have applied successfully to their difficult task. In Austria there are now eight television programmes per school month, each lasting about 60 minutes. They can sometimes be used as early as the third school year.

The periodical *Telespiegel*, published by the Austrian radio and television authority in collaboration with the Federal Ministry of Education in Vienna, gives a short illustrated introduction to the schools television programmes, for the use of teachers. Since the beginning of 1965 this preparatory material for teachers has been effectively supplemented by transmitting new school television programmes on the technical testing channel (2nd channel) two days before they are due to be shown for schools.

The expansion of educational television is held up by the high cost of television receivers, heavy maintenance expenses and the lack of a moderately-priced recording apparatus of satisfactory quality. So far, only one Austrian school, the *Technologisches Gewerbemuseum*, in Vienna, has been able to acquire (autumn 1964) a Philips video recorder for trial and use.

The use of schools television, as a modern audio-visual aid enabling the teacher to enhance his lessons, is left to the discretion and choice of the teacher; but since 11th June 1964 an order by the Federal Ministry of Education has made an audio-visual instruction (film, radio and television) compulsory in Austrian schools, from the 7th to the 11th year, to the tune of four or five programmes per annum. By preparation of the subject-matter, followed by observation and evaluation of films and radio and television pro-

grammes, the master and his pupils are expected to assess the pros and cons of these mass media. According to the age-groups of the pupils, both prize-winning programmes and average productions are used.

Demonstrations and experiments in closed circuit television in the United States and in Western and Central Europe have been closely followed in Austria for a long time, in particular by the Audio-visual Aids Department of the Ministry of Education, under the direction of Dr. Tänzer.

The *Technologisches Gewerbemuseum*, which I have mentioned, and to which I have the honour to belong, is a federal college for technical education and research in Vienna, similar in size and standing to the Seraing Institute, and experience in tele-communications goes back to 1912. On 11th January 1965 the college submitted to the Federal Ministry of Education a plan for an *Austrian research centre for closed circuit television in schools.* As far as possible, this project will exploit new techniques and draw on the results already obtained by other experimental centres. It should provide scope for a great number and variety of operations, experiments and plans. The diagram shows the lay-out of the proposed installations, comprising:

1. *Two adjacent studios*

These will permit consecutive lessons to be prepared without disturbance. The first studio (Room 23) is intended mainly for practical subjects such as physics, chemistry, technology or other specialities. The second studio (Room 21) is designed for drawing and construction lessons. Other subjects such as mathematics, modern languages, divinity and so on may be given in either studio according to the timetable. The studios will be large enough for an originating class to be installed in each. In this way the pupils in this class can follow the lesson in the studio directly as in an ordinary schoolroom and the demonstration is transmitted at the same time to other classes.

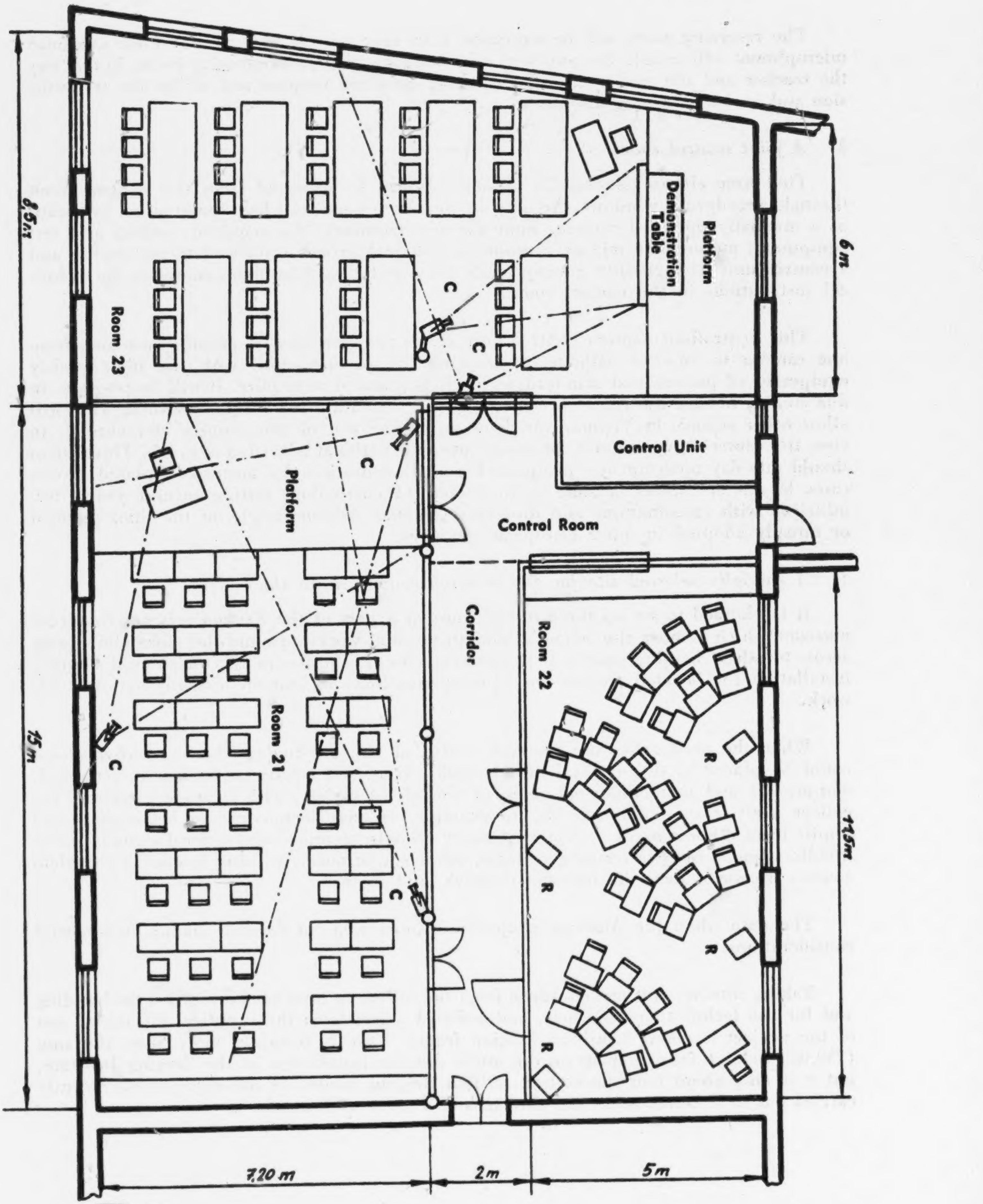
When completed, the studios will be equipped with two fixed television cameras with remote control zoom-lenses, one of them with remotely controlled pan and tilt head, and a monitor for the teacher in the studio. The use of plumbicon tubes in the cameras will eliminate reception interference such as shadows, in rapid shots, and the flickering produced by the highlights of the picture. Further, the extreme sensitivity of the plumbicons eliminates the need for a high level of illumination in the studios (fluorescent lighting in suitable colours, as few studio lamps as possible). This makes it easier to keep the room-temperature down, and almost normal lighting can be used for the teacher and pupils of the originating class. In its final stage, the unit will also include two television receivers, to help pupils of the originating class to follow the demonstrations. Finally, the studio equipment could be completed with accessories for microprojection and for showing oscillograms, opaque and transparent pictures and films. Sound communication with the receiving class is provided by means of a portable microphone (intercom) for the teacher in the studio, five overhead microphones spread over the room and loudspeakers.

The studios will be so constructed as to ensure that the acoustics are good, and that they are soundproof and shielded from direct sunlight.

Both teacher and pupils will appreciate not being distracted by the presence of any technical or administrative staff during transmission.

2. *A receiving room (Room 22)*

This will be near the originating room to allow prompt exchange of experiences. Other rooms in the school building can be adapted for reception.



Room 23
Platform
Demonstration Table
C
C
C
Control Unit
Platform
Control Room
Corridor
Room 22
Room 21
C
C
R
R
R
8.5 m
6 m
15 m
14.5 m
7.20 m
2m
5m
N

Key :

C = Camera

R = Receiver

The receiving room will be equipped with four television receivers. Four overhead microphones will enable the pupils to communicate with the originating room; in this way the teacher and the pupils in the originating class can prepare and utilise the transmission and lead the ensuing discussion.

3. *A joint control room*

The three classes (Rooms 21, 22 and 23) can be observed from this control room through soundproof windows. Activity in the three rooms can be photographed by means of a manually operated camera. Four viewing monitors, the required control and test equipment, audio-video mixing consoles, a talk-back circuit connected to the studios and a control unit with circuity governing all the cameras — these items complete the technical installations in the control room.

This centralised camera control unit serves two purposes: it permits switching from one camera to another without interrupting the picture, and, with the high quality equipment of professional standard which it is planned to acquire, it will be possible, in due course, to link the research centre directly with the open circuit network. This will allow other schools in Vienna, and later on in the rest of the country and abroad, to view the centre's programmes, broadcast over the national television network. This system should one day open up new prospects for adult education, by means of isolated broadcasts, lessons or courses, leading up to a televised curriculum lasting several years, terminating with examinations and diplomas (*Zweiter Bildungsweg*), on the lines planned or already adopted in other European countries.

4. *A specially selected site for the research centre within the college*

It is planned to set up these installations in a part of the *Technologisches Gewerbemuseum* which is near the school's laboratories and workshops and therefore allows easy access to other shooting points. It is also very close to the flat roof, which would simplify installation for beamed transmission (microwave link) to join up with the national network.

When the need arises the research centre of the *Technologisches Gewerbemuseum* could be placed at the disposal of the whole Austrian teaching profession for technical, educational and methodological work of the widest variety, with relays to classes in the college itself or in similar schools, for example, or trial demonstrations by teachers and pupils from other schools — upper primary schools, technical and general secondary and middle schools, teacher training colleges, adult educationists utilising lessons or complete courses broadcast over the national network, and so on.

The date when the Austrian project will be carried out depends mainly on financial considerations.

Taking into account contributions from the college or interested bodies for the building and for the technical installations, and reduced prices from the supplier, the initial cost of the project is about 1 million Belgian francs. This is certainly more than the sum (750,000 Belgian francs) spent on the much simpler installation at the Seraing Institute, but it is only about half the cost (2 million Belgian francs) of the experiments recently carried out in Hanover under the direction of Professor Heinrichs [1].

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[1] See the communication hereafter.

PRESENT STATE OF EDUCATIONAL TELEVISION IN THE FEDERAL REPUBLIC OF GERMANY

**Statement based on the notes of
Professor J. Zielinski,
Director of the Institute
of Educational Sciences of the Technical University,
Aachen,
and presented by Mr. H. Gies,
Assistant at the Technical University**

The Federal Republic of Germany is, I feel, lagging behind other countries in the use of television in education.

This may be due in part to a certain scepticism among the teaching profession towards this new medium — indeed, other modern technical teaching aids, such as school radio broadcasts and educational films, have barely yet found complete acceptance; and it may also result from the hesitations of the transmitting stations, which have long been uncertain as to the possibilities and functions of the first, second and third channels.

However, since September 1964, there has been an open circuit television programme for schools in the Federal Republic, too, although at present only in the service area of Bavarian Radio.

Mr. F. Reinholz, of the North German Radio, Hamburg, carried out the earliest trials in 1961; but it was only with the launching of the third channel, whose programmes are transmitted by the various stations in their own areas, that due importance seems to have been given to the educational aspects of television. A third channel programme is now broadcast by the radio and television authorities of Bavaria, Hesse and North Germany (Hamburg), in collaboration with the "Free Berlin" and Bremen stations. West German Radio, Cologne, will probably start its third channel programmes this year (1965), and the remaining stations will no doubt follow suit in the near future.

Although the stress varies from one station to another, they seem to share a broadly similar conception of the programmes. The Bavarian Radio, which is trying to use its third channel almost exclusively for educational and instructional purposes, perhaps goes furthest.

Educational television broadcasts from Munich fall into three parts: instruction proper; information on current affairs and topics; evening study.

The instructional programmes include school television, whose main purpose, as in Belgium and France, is to enhance and illustrate lessons at school, and the *Kursprogramm* — series of regular courses intended mainly for adults.

Last year this *Kursprogramm* included such topics as motorcar breakdowns, history, skiing and first aid, as well as a series on educational advice. It seems that the Italian course was the most successful, for bookshops quickly sold over 10,000 copies of the supporting handbook.

This success has encouraged the Bavarian Radio to announce that it will expand its language courses in the coming terms, with the motto "Learn languages for Europe".

In the information programmes on current affairs and topics, specially chosen films, pictures and records are presented with commentaries by leading authorities. The evening study programmes constitute a sort of adult education institute. On the one hand they cover intellectual subjects, and have recently included philosophy lectures by Professor Jaspers, a course on the ancient theatre and an introduction to behaviour psychology. On the other hand there are individual broadcasts on commercial and agricultural matters, aimed at a limited audience with a common interest.

In this respect, the curriculum for the second route to university (*Zweiter Bildungsweg*), to be televised by the Bavarian Radio on its third channel should be of great interest. In this way, it is hoped, in close co-operation with the technical and vocational schools, to enable people to become qualified for senior professional posts, or to gain admittance to more advanced educational establishments.

In the field of closed circuit educational television, too, many trials are being carried out in Germany in order to assess the potentialities of the television camera in schools.

In 1962, Mr. Thomale, of Duisburg, carried out an experiment, lasting a week, in a primary school, with linked classrooms. From April to June 1964, large-scale tests were made under the direction of Mr. Erich Frister in a secondary school — practical section (OPZ) — at Berlin-Tegel. Altogether, 66 school transmissions were made in closed circuit. Series of various kinds were tried out for their suitability in education, and exhibits relating to almost every syllabus were shown on the screen — physics, chemistry, mathematics, natural science, history, sociology, geography and so on. From August to December 1964, another experiment in closed circuit school television was made at the Gustav-Freytag School at Berlin-Rheinickendorf, including a course on the slide-rule. A number of technical and vocational schools, including Hamelin-on-the-Weser and the members of the Union of Vocational Schools (*Berufschulzweckverband*) of Herford-Bünde-Ennigloh are equipped with television installations.

The most ambitious experiment so far has been that carried out by Professor Heinrichs at Hanover in December 1964. The *Volkswagen* Foundation contributed 166,000 DM.

Lessons were conveyed from a transmitting class to three other classes in different schools. The teacher and the remote classes were in direct video and audio communication (two-way system). The teacher was able to observe the pupils of all the classes by means of monitors and could put questions to them if he wished. All the pupils were able to question the teacher in the originating class.

As the aim was to explore all the possibilities of televised education, a large array of technical equipment was employed, including 3 mobile high quality cameras.

According to Professor Heinrichs and a number of observers, it appears that, although some very positive results were recorded, this experiment also served to define the limits to the use of television. It appeared that closed circuit television for schools could become a valuable aid to teaching but that there were severe limitations on "multiple" teaching (by simultaneous transmission of the lessons to several classes).

Finally, it should also be noted that closed circuit television is also successfully employed in the Federal Republic in teacher-training. At the Bonn Teacher Training College, classroom lessons are, by means of a special installation for their observation (*Unterrichtsmitschauanlage*), projected on to a film screen (using a Philips Eidophor) in the lecture hall, so that several hundred students can observe the lessons which are expounded and analysed over loudspeakers by teachers and specialised lecturers in a separate booth.

The college at Bonn also possesses a video recorder (Ampex) with which Professor Schorb plans to record recurring classroom situations; these recordings would be transferred on to film and could be loaned to other training colleges. A similar observation set-up is used with success at Heidelberg.

Experiments in televised education in the Federal Republic will certainly be further developed in 1965. Already sixteen towns, including Giessen, Hildesheim, Göttingen and Dusseldorf, have announced that they are planning to preparing trials in closed circuit school television.

STATEMENT BY THE REPRESENTATIVE OF THE HOLY SEE

(SUMMARY)

Canon G. Vermandere,
Director of Catholic Technical Schools
at Mechlin (Belgium)

The representative of the Holy See explained that the Holy See, while it takes responsibility for a network of schools throughout the world, leaves the choice of teaching methods and techniques to the discretion of the authorities in each country. However, being fully conscious of its role in education and moral training, the Holy See is bound to take an interest in mass information media. The Vatican has had a radio broadcasting station for many years but does not have a television transmitter since the range would be too small.

The representative of the Holy See stresses the need for teachers in our generation to adjust their methods in order to "get through" to the young people of to-day, so "conditioned" to direct and audio-visual forms of education. Christianity, born in an unlettered world, reached the people through the spoken word and through song, images and the drama of its liturgy, written texts being accessible only to a minority of scholars. Only during the last quarter of its existence has its teaching been given largely in printed and verbal form, in the same way as secular teaching.

Verbal forms have given rise to verbalism — the very thing the present generation recoils from. That is why modern Christianity is seeking new methods of communication and information, based on the "audio-visual" methods of the past and capable of being employed by clerics, who, as a rule, are not technicians, without exceeding the means of a school or parish. There is a remarkable similarity between this approach and the resort to closed circuit television.

This explains in part the interest of the Holy See in the seminar. Many of the ideas expressed at the meeting find a parallel in papal documents, in particular the *Motu Propriu* "In fructibus multis" of 2nd April 1964 and the decree on social communication media promulgated by Vatican II.

EDUCATIONAL TELEVISION IN IRELAND

Communication by Mr. H. de Lacy,
Principal of the College of Technology,
Kevin Street, Dublin

Early in 1963, at the request of the Irish Department of Education, the National Television Broadcasting Service, *Telefis Eireann*, began the study of educational programmes in science subjects for secondary schools. With the co-operation and help of the Department of Education these studies resulted in the production of two programmes — General Science for Junior Secondary School Students (14 to 16 years) and a Physics programme for Seniors. This service was inaugurated in the spring of 1964 and has continued ever since. Two language programmes were introduced at a slightly earlier date and are directed more at the adult than at the full-time student. A course in new mathematics will commence in autumn 1965.

In the field of closed circuit television nothing has been attempted outside the city of Dublin where the two colleges of technology have carried out a series of experiments with a single camera chain which has confirmed the usefulness and flexibility of closed circuit television as a teaching aid. The experiments in the main were of the "magnifying periscope" type and no detailed effort was made to assess the usefulness of television in other ways.

The College of Technology, Kevin Street, will be occupying a large new building this year and it is planned to install three cameras and a video recorder for closed circuit television as the first stage of a plan for developing an educational television service for technical education within the City of Dublin. During the course of construction of the new building the opportunity was taken of installing coaxial cable and sound networks specifically for closed circuit television. All lecture theatres, demonstration classrooms, most workshops, a number of laboratories, assembly halls, gymnasium and swimming pool can be fed with television signals originating from within the College or taken "off the air". By building in a network it is hoped that, apart from avoiding trailing cables, the immediate availability of connecting links will stimulate the use of the television cameras by the teaching staff and reduce technical and installation difficulties resulting from temporary links. No provision has been made for a permanent studio within the new building as future plans envisage the establishment of studios at another site.

This first stage of development will endure for twelve to eighteen months and will primarily be connected with the gaining of experience and the developing of expertise in this medium. During this period a UHF transmitter will be installed and propagation tests carried out in preparation for stage two. During stage two programmes in mathematics and science subjects will be radiated from Kevin Street College of Technology to sixteen vocational schools in the City of Dublin, all of which are under the same educational Authority and all of which follow the same curriculum. The primary objectives are to raise the standard taught in these subjects and also achieve a closer degree of uniformity in the teaching. The programmes in effect will form a skeleton framework which the teachers in the various schools will use as the core of their lessons and upon which they will expand and develop. The programme content will be the responsibility of the Schools Psychological Services Department.

Stage two of development will exist untill the newly planned Technical Teacher Training College is commissioned towards the end of 1969. The Training College will incorporate a properly designed and constructed television centre, comprising one large and one small studio, talks studio, control centre and ancillary rooms. Programmes will then originate from this centre, be relayed to College of Technology, Kevin Street, and then broadcast to the schools which by that time will probably have increased to at least twenty in number.

The National Television Broadcasting Service has encouraged and helped us in our planning. They have intimated also that our programmes could be of interest to the national service and in this respect have encouraged us to think in terms of broadcast standards in relation to the video recorder.

STATEMENT BY THE NETHERLANDS DELEGATE

M. A. Segaar,
Inspector of Technical Education,
The Hague

We have heard enthusiastic descriptions of the use of closed circuit television in schools. Many speakers have defended the system, and, for greater clarification, several lessons have been presented.

It was striking to observe how many adults are needed to produce one lesson for a class of pupils. It should therefore be noted that this method is very expensive. Costs will remain within reasonable limits only if the system is employed for at least 100 pupils, possibly distributed among a number of schools.

Many educational arguments may be accepted, without further ado.

It is certainly true that demonstrations which are difficult for a whole group to watch can very well be shown on the television screen; television therefore serves as a visual aid in this case, and has the advantage of greater immediacy than a sound film.

On the other hand, a sound film can be made in colour under ideal conditions and many copies can be circulated. Throughout the lessons presented at Seraing, it could be seen that short colour films are to be preferred to television as a teaching aid, for the following reasons:

1. The reproduction is better.
2. The group can be of any size.
3. Direct staff costs are lower.
4. They can be shown any number of times.
5. Very little preparation of pupils is needed during the lesson.
6. Details can be studied for a longer period by holding the picture.
7. Purchase costs are relatively low.

The use of *closed circuit television* is economically justifiable in the following cases:

1. when a particular demonstration calls for too much intellectual and material effort to be repeated after a brief interval;

2. when, through unavoidable circumstances, there are more pupils than is normal.

Other cases in which *school television in general* can be recommended are:

1. when an event can be shown and direct transmission is of educational value;
2. when television lessons are prepared and transmitted by a team specially trained for this purpose, and when the schools taking part hold these lessons at the same time.

Finally, a note of warning should be sounded against the supposition that the mere existence of a teaching aid warrants its use in education.

EDUCATIONAL TELEVISION IN NORWAY

Communication by Mr. J. Helgheim,
School Director,
Oslo

The broadcasting of open circuit educational programmes began in 1962.

In the school year 1964/65 six educational programmes a week have been broadcast from September 1964 to April 1965. They have been designed for the elementary level, from the 1st to 9th grades.

The School Television Division of the Norwegian Broadcasting Service reports that the interest in open circuit educational programmes is increasing among teachers. The number of programmes will gradually be increased so as to include secondary school level as well.

Closed circuit television equipment has recently been installed in one vocational school and also in one technical school in Oslo, and is being used on an experimental basis.

In the Oslo University and in the Bergen University closed circuit television is being used at the Medical Faculty. At the Odontology Institute in Bergen closed circuit television is also being used as an educational aid.

CLOSED CIRCUIT TELEVISION IN EDUCATION IN SPAIN

Communication by Mr. E. Gil Santiago,
Teacher at the Technical School
for Telecommunications Engineers,
Madrid

I gained my first experience of closed circuit television at a surgical congress in Madrid in 1958, where I was able to judge the value of the system when the field of view is very small, as — for example — in eye operations.

Later, while I was a lecturer in physics at Caracas, the Faculty of Science acquired a closed circuit television installation for research and teaching in metallurgy and solid state physics (crystal growth, dislocation etc.) The system includes a microscope specially adapted for use in conjunction with a closed television circuit, and its stage can heat the object electrically to a high temperature. This permits observations of surface changes in the sample (dislocations and so on).

My view is that besides being useful in education, as we have seen in these discussions, this system seems particularly useful for experiments and research where the field of view is so restricted that it is impossible for a large number of students to watch the demonstration, or in cases where the preparation of individual experiments takes much time and care.

Closed circuit television has not yet been systematically developed in Spain, unfortunately, but open circuit educational programmes have been broadcast, though on a small scale compared with France.

However, the Madrid Technical School for Telecommunications Engineers plans to acquire a closed circuit television installation, and my visit to Seraing will help me in urging on my Government the advisability of extending this system to other schools and science faculties. This is possible under the development plan which my country is now drawing up, and by reason of the amazing increase in the student population; in my establishment, for instance, numbers have risen, in the space of three years from 20 or 30 first-year students to 500.

PROMOTION OF THE USE OF AUDIO-VISUAL AIDS IN EDUCATION IN TURKEY

Summary of the communication by Mrs. N. Oztilmen,
Department of Educational Supplies and Technical Co-operation,
Ministry of Education,
Ankara

Closed circuit television is already used for educational purposes in universities (Medical Faculty of Istanbul, Technical University of Istanbul) and in certain hospitals.

Open circuit television does not yet exist in Turkey. The independent Turkish Radio and Television Service, comparable with the BBC, has bought television equipment from Germany. As soon as the equipment is ready for use, it is intended to broadcast school programmes organised on a co-operative basis by the Radio and Television service and the Ministry of Education, as in the case of school radio broadcasting.

The Ministry of Education encourages the use of audio-visual aids in general. Below is a short summary of what has been done in this field and the methods adopted, which will help to solve a large number of problems when television is introduced in the near future.

An audio-visual centre and science equipment centre (a workshop) have been installed in Ankara. The Audio-Visual Centre contains a film section, a photographic section, a graphics section and a radio section. It is also proposed to create a television section; the teachers who will be responsible for setting it up have received training in other European countries and the United States.

The Audio-Visual Centre and the Science Equipment Centre are both under the authority of the same department of the Ministry of Education — i.e. the Department of Educational Supplies and Technical Co-operation. By this means certain difficulties of co-ordination have been overcome. Two years ago, for example, an experimental radio-vision programme for adults was shown in the villages: charts, documentary material, slides and brochures for the teachers and students were prepared in the Audio-Visual Centre. Certain three dimensional aids were produced in the Science Equipment Centre and scripts were written by teachers in the Audio-Visual Centre's radio section.

In order to spread the new educational ideas throughout the country and help teachers to become acquainted with modern teaching aids, an auxiliary audio-visual centre has been created in each town. In summer seminars are held in the big towns for the staff of these auxiliary centres, and in nearly all cities workshops have been established for teachers desiring further training.

A joint committee for liaison between the Turkish Radio and Television Service and the Ministry of Education already exists. This, and the fact that the Turkish educational system is highly centralised, will greatly facilitate matters when educational television programmes are introduced.

In Turkey there is a shortage of teachers and schools, there are financial problems and difficulties of communication between towns and villages, and adult education is badly needed. It is therefore intended to study all new educational media from the widest possible angle so as to make the maximum use of them.

The Turkish educational authorities are concentrating particularly on television which combines the advantages of so many educational aids, and closed circuit television could perform a most useful service in Turkey, paving the way for the use of open circuit school television on a national scale.

In Ankara the Middle East University, the Science Faculty, the Higher Technical Teacher Training College, the Higher Teacher Training College, secondary schools, vocational schools and elementary schools are all grouped in the same part of the town, as is also the Audio-Visual Centre and Science Equipment Centre and other bodies. For this reason, it is hoped to set up a closed circuit television centre close by, so that it can be used for several different purposes whether to show (student) teachers the possibilities of television or to train the necessary staff for open circuit educational television.

SUMMARY OF PROCEEDINGS
AND
CONCLUSIONS

SUMMARY OF PROCEEDINGS AND CONCLUSIONS

By the Chairman of the Steering Committee,
Mr. H. J. Edwards

1. The end of our conference has come. We must now pull together the threads of our discussions, make clear the principal ideas, and come to some conclusions. I will try to summarise our discussions and present you with six points which may serve as our conclusions.

2. First let me make one general observation which even though it is quite obvious is of considerable importance. There is throughout Europe a great interest in the use of closed circuit television in education and there is a great deal of experimental work going on. The attendance at this conference of so many distinguished delegates from member countries and their constant attention to the business of the conference shows that the European Bureau of Youth and Childhood were well justified in asking the Council of Europe to arrange our meeting here in Seraing. During our sessions we have heard with interest of development in many countries and we would urge the Council of Europe to maintain its interest in the subject and to arrange another meeting at a later date.

3. Now let us consider the results of this conference. First let us go back to the original aims of the conference. We came here:

(i) To see the way in which our colleagues in Seraing were using closed circuit television.

(ii) To bring together experts and teachers from many countries to exchange information.

(iii) To see how best closed circuit television could be used in technical education.

4. First of all we had to understand just how closed circuit television was being used here in Seraing, why they have chosen this particular equipment and why they use it this way. Secondly, we had to try to understand the system of technical education which operates in Liège in order that we could understand the part closed circuit television is playing in the curriculum of the pupils. Thirdly, we had to understand how this use of closed circuit television fits in with the open broadcast programmes of the Belgium radio and television services. It is always difficult to understand precisely how another teacher or another school or another educational system works and for the first few days this occupied much of our time.

5. In all that we have seen on the work in Seraing we have been impressed by the keenness of the staff, by the thoroughness of the preparation of the lessons in which television was to be used, by the efficiency of the actual transmissions and by the careful follow-up of broadcasts in the classroom after the programme has been transmitted. It is fair to say that in Seraing here the aim has been to provide closed circuit equipment which is flexible and capable of a great range of effect, but which is easily controlled by the teacher with the least interference by technical staff. In this way the teacher can put his ideas across and he is not dominated by the machinery or forced to teach in a way with which he does not agree. Whether or not this can be done depends largely upon the equipment provided, the range and flexibility and its control.

6. The same problem has been noted in other countries and we have heard reports from the United Kingdom, from France, from Sweden and from Germany which show a great deal of thought has been given to the invention of closed circuit television systems which will give the teacher the freedom to teach in his own way more effectively and which do not require him to present his subject in a way which is against his best inclinations and understanding. We decided in discussions that this problem becomes more difficult

the more ambitious is our use of closed television. We marked out three stages in the use of closed circuit television.

Stage one is that in which simple television equipment is used directly by the teacher as a microscope or a periscope of unusual flexibility, illustrating tiny details for bringing into the teaching room objects at a distance or those which are too difficult to introduce. This stage we agreed was capable of much variation and teachers generally should be encouraged to develop it to the full. By using simple television equipment of this nature teachers come to understand the medium and to prepare themselves for more extended and sophisticated applications.

Stage two we decided was that at which teachers demanded more complex equipment to carry out more subtly the ideas they wanted to express. This results in the use of two or more cameras and control equipment which demands a studio staff of producers and technicians. By asking for more subtle visual experiences the teacher puts himself in danger of being dominated by the technician and the producer.

Stage three is reached when teachers set out to link several schools and colleges to one central studio putting out teaching programmes under professional or near professional standards. Projects such as these require studio organisation simpler than those used by professional producers and organisations but in fact very similar. Great care is needed if the teachers themselves are to remain in effective control of the programmes which are produced.

7. In Seraing here our colleagues have deliberately put themselves into stage two and accepted a relatively elaborate studio organisation in order to obtain the degree of technical presentation they require. Their studio is perhaps rather more elaborate than others we have heard about but we can understand why. There is a need for considerable thought to be given to the design of the closed circuit television equipment for educational purposes. At the moment we have available cheap and reliable equipment designed for industrial use which will do many simple operations but which is seldom good enough or flexible enough for educational purposes. Then we have a large range of relatively expensive, more complex and more delicate equipment designed for professional and semi-professional studio work, capable of many operations but usually demanding technical and production expertise beyond that of the ordinary teacher. We need equipment which falls between these two extremes, which is cheap and reliable, easy to use and control by an ordinary teacher and which is yet sufficiently flexible to give all the subtle effects which we are accustomed to seeing in professional television.

8. In this matter of developing new equipment, technical colleges have a particularly important part to play for they have among their teachers men and women who are accustomed to experimenting with machinery, who are not frightened of it and who are forceful enough to alter it in order to make it do what they want.

9. Clearly many people are interested enough to experiment in this way and there is a need for the regular and systematic exchange of ideas. A matter which it is appropriate for the Council of Europe to consider. There is another good reason for asking the Council of Europe to take an active interest in this. The manufacturers of television equipment are international in their connections and as educationists we should be able to put forward our suggestions to them as international suggestions on behalf of teachers all over Europe.

10. The teacher should be in control of the camera. Should he also be in control of the students who are viewing the programme? This is a problem posed by the work in Seraing here and is one of much general interest. You will have noticed that the transmissions we have seen are directed quite deliberately at very small groups of pupils. They have

been designed very carefully as one part of a teaching cycle. First the content of the course has been analysed and some parts of it assigned to be taught orally, some visually and some practically. The transmission in effect has a carefully designed place in the programme: it controls the visual presentation of certain ideas. In the same way the carefully prepared follow-up material controls the responses of the pupil to what has been presented. This is in effect television used as an element in a programmed instruction course in which the subject matter is presented to the student in small simple steps and his responses so controlled that he learns easily without making mistakes. In the United States and in the United Kingdom and in France certainly there is considerable interest in using a variety of techniques in a programmed instruction course and this is an interesting experiment of that kind.

11. But is it a proper use of television? Television is after all the broadcast medium by which one teacher can speak to many students. But he cannot hope to know all who chance to listen to him, nor can he hope to control the response of those who view; he can help to do so by providing lesson aids before and after the broadcast. Here in Seraing the teacher knows personally the group to whom he broadcasts and in fact he teaches them face to face. The method is undoubtedly efficient but could it be extended beyond the immediate group of students in this room? Could the lecturer broadcast to many students and still, by programmed instruction, control the responses of the students? I suggest that our colleagues in Seraing investigate this possibility.

12. I am suggesting that whatever we do we should work within the nature of the medium and not against it. We are not yet very clear about the proper place of television in education and we have a good deal to find out. When a new invention appears or a new tool is designed or a new machine is made, we first of all tend to play about with it, delighted to find that we can do accustomed tasks much better than before. This is the Stage A use of television in which with simple equipment we find we can show students much more easily than before complex or remote operations. But after this stage has been explored there is a second one in which we find out that the new tool, the new invention, enables us to do something we could never do at all before, sometimes quite unexpected operations. These new facilities in their turn enable us to discover new ideas, to invent new tools and still new machines.

13. What is there new that television can do? This is difficult to answer but I will hazard one or two ideas:

(i) We can put before our students, with an ease undreamed of a few years ago, ideas in visual form.

(ii) We are not entirely sure whether pupils learn more easily by hearing about ideas, reading about them, or by seeing them in motion. Certainly some ideas can only be transmitted by pictures that move; and certainly some ideas can never be fully explained by words only or by sounds only. And certainly some people find it easier to absorb ideas presented visually and some people find it easier to accept ideas presented in words. At present words are our customary medium of expression and communication. There is room for much more visual presentation of ideas in the normal process of education.

14. But for us to be able to use these easy means of visual presentation we must accept that we have to rethink our ideas in order to reshape them in visual terms. Hence the need for hours of preparation before a television lesson does its work efficiently. But we need to rethink much of our teaching anyhow for a number of reasons. We all know, for instance, that the subject content of many subjects is changing and that what we teach needs to change also. The introduction of closed circuit television may have great value here. Some teachers are fascinated by its use and are willing to spend a great deal of their time on adapting their teaching to the new medium. This is in effect one of the kinds of subject rethinking which we must encourage with all the strength we have for a number of very pressing reasons.

15. We have been told that here in Liège there is no shortage of teachers and no need to consider closed circuit television as a method of saving staff or even of deploying them more successfully. But in many European countries the school population is rising rapidly; there will be difficulty in finding enough staff of the right calibre to teach some parts of the curriculum. At the same time knowledge expands and diversifies; we as teachers are being asked to teach more in a shorter time and to more students. We have accepted in the past that some ideas were too difficult for any pupils to grasp except a few of the most able. We are now asked to think again and to make difficult ideas available to many more students of less intellectual ability. We are in short asked to become much more efficient as teachers. We should do this by thinking hard about what it is we want to teach; by being willing to present our ideas in new ways; and by putting ourselves out to be attractive to our students. In all these efforts closed circuit television can be a powerful ally. It can force us to rethink ideas; it can present our teaching attractively; and it can appeal to many students who would not otherwise be interested. It remains for us to discover for ourselves how best we may use it and to this end this conference was called. To this end this conference has worked.

16. To sum up. First of all there are two broad general observations I should like to make which I think reflect accurately the spirit in which this conference has been undertaken.

(i) There is a great interest in Europe in the use of closed circuit television in teaching and this conference has been well worth while for the opportunity it afforded us to study this idea intensively and to exchange information between a number of countries.

(ii) Using closed circuit television demands from the teacher a different way of looking at traditional subject matter and in this way it is of great value in the in-service training of the experienced teacher. It can be introduced simply, easily and quite cheaply and the medium explored with quite elementary equipment. When teachers have established confidence in the use of the medium they can be encouraged to go further to the next stages of more complicated equipment. The value of closed circuit television at this stage may well be greater in its effect upon the staff than its efficiency in making ideas clear to pupils and for this reason it may be politic to use closed circuit television in situations in which it looks uneconomical.

17. There are four conclusions which I think the conference will agree are worth making:

(i) The changes which are taking place in the use of closed circuit television are very rapid and there is a great value in regular and systematic exchange of ideas between countries. The Council of Europe should take steps to make this interchange an easy one.

(ii) As far as possible the teacher should be in charge of what goes out to the closed circuit television. Whether this is possible depends very largely on the technical facilities available. Experiments are needed to discover cheap and reliable equipment for educational purposes which a teacher can use giving a full range of technical effects.

(iii) If equipment of this kind is to be in regular use, then school construction should be so designed that it takes account of the probable use of audio-visual aids in the near future.

(iv) In this development work technical colleges have a great part to play in that they are staffed by people who are accustomed to machinery and willing to modify it to suit their purposes. We should encourage experiments in the use of different forms of new media in combination. For example, closed circuit television and programmed instruction.

●

In the discussion which followed the summary and conclusions by the Chairman of the Steering Committee two interesting observations were made by Mr. Brunswic. He pointed out that the use of closed circuit television on an extensive scale, such as occurs when a district studio is set up, produces considerable problems for the administrator. For example:

(i) Programmes require a great deal of preparation. Should this be thought of as part of the normal preparation work of a teacher or should there be special allowances or time for this work? A programme could be transmitted to many students: should the teacher be rewarded for the additional responsibility? A programme could be recorded and re-transmitted; it could be recorded by another school and re-transmitted; has the teacher who originated the programme any copyright? These problems will arise in every country and programmes may in future be exchanged on an international basis. Could the Council of Europe initiate discussions amongst member countries which would lead to the formulation of internationally acceptable rules on these matters?

(ii) In the preparation of a programme the teacher may find his own ideas modified by producers, technicians and others involved in the production. He may find himself being asked to put forward ideas in which he does not believe. Has the teacher any protection against such situations? Could the Council of Europe design a charter which would protect teachers against such situations?

* * *

The summary by the Chairman of the Steering Committee, together with the additional remarks by Mr. Brunswic, was accepted by the participants in the Seminar as an accurate account of the proceedings and conclusions.

APPENDICES

Appendix A

THE USE OF CLOSED CIRCUIT TELEVISION IN THE TRAINING OF PRIMARY SCHOOL TEACHERS IN SWEDEN

Communication by Mr. Stig-Uno Ek, Consultant,
School Broadcasting Department,
Swedish Board of Education [1]

In Sweden a committee has suggested experiments with closed circuit television at the teacher training colleges. Reports about the experiments were published in 1964. I only want to present to you some of the problems and results of this preliminary work.

The teachers were trained for work in primary schools (classes 4-6). If we examine some typical situations in the methodological instruction of these teachers we can point to:

(*a*) Information on psychological, pedagogical and methodological matters (lectures, demonstrations, experiments, elementary studies of the behaviour of the pupils, the interaction between teacher and pupils and between pupils).

(*b*) A process of evaluation. The teacher draws conclusions from his experiences. He forms attitudes to the problems (discussions, seminars, exercises).

(*c*) Practising in the training school.

There are many situations in the training of teachers where information and demonstration are very important.

Here I only give you some examples of the experiments with closed circuit television.

1. *A selective function*

You can concentrate your instruction upon essential activities, point to central problems.

We have often used the classroom as a studio and with the help of two cameras we have studied the teacher's work in the classroom and also the interaction between pupils in small groups. For instance there were lessons in geography. The teacher prepared and prompted the pupils, after which they worked in groups. The student teachers — sitting in another room — were given methodological comments by readers in pedagogics. We have also studied situations when the teacher instructs a single pupil. In Sweden we have special forms of education for children with difficulties in reading and writing. It is important to demonstrate methods in this education and we have done it successfully in closed circuit television.

In a training school you often want to demonstrate the effective use of audio-visual material. Sometimes we have observed good results when such material was presented by closed circuit television.

2. *Infrequent situations in the training school*

— a special lesson by an expert;

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[1] Although this subject falls outside the scheme of the Seminar, Mr. Ek had been invited to introduce it as a contribution to a better knowledge of the variety of applications of closed circuit television.

Appendix B

FINAL MEETING OF THE STEERING COMMITTEE

After the closing of the Seminar, the Steering Committee considered the results obtained and made proposals for continuing action. The main points made were:

1. The conference had achieved its aim of bringing together representatives of member countries for an interchange of views about the usefulness of closed circuit television in technical education. The European Bureau of Youth and Childhood should be thanked for bringing the need for such an international conference to the notice of the Council of Europe. The great interest shown by participants and evidence of the rapid development of closed circuit television techniques and applications in many countries pointed to the conclusion that there should be other conferences in future years.

2. In view of this rapid development the Council of Europe should take systematic steps to assure continuing action and the interchange of information. It should determine the exact boundaries of its future activities, bearing in mind the interest taken in television and education by other international organisations. In doing this the Council of Europe should consider the part to be played by closed circuit television in education in general and should not limit itself to its applications in technical colleges.

3. Three suggestions were made for *future seminars:*

(i) a seminar in the United Kingdom to discuss the use of closed circuit television in the training of teachers;

(ii) a seminar in France on a new approach to teaching on the basis of integrated closed circuit television;

(iii) a seminar in Sweden.

4. *The interchange of information* could be achieved by:

(i) setting up in Strasbourg an information centre which would make available in French and English significant studies in the investigation, development and utilisation of educational television;

(ii) arranging for the interchange between member countries of individual teachers with experience of the operation of closed circuit television teaching systems.

5. Television *equipment* for educational purposes must be developed and standardised. Since most of the manufacturers concerned are international companies, the Council of Europe should collect proposals from member countries and put suggestions to these firms on a European basis.

6. In regard to *teachers' "rights"*, the Committee considered that questions of copyright, royalties and the like were the province of legal rather than educational experts; in any event they were already being investigated by other organisations. As for the remaining problems with which the use of closed circuit television confronted the teaching profession (organisation, responsibility etc), the Committee thought it would be more profitable to consider these in detail at a later stage.

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